

BUTTE-SILVER BOW CITY/COUNTY, MONTANA
TOWN OF WALKERVILLE, MONTANA

HAZARD MITIGATION PLAN

February 2004

Prepared by:



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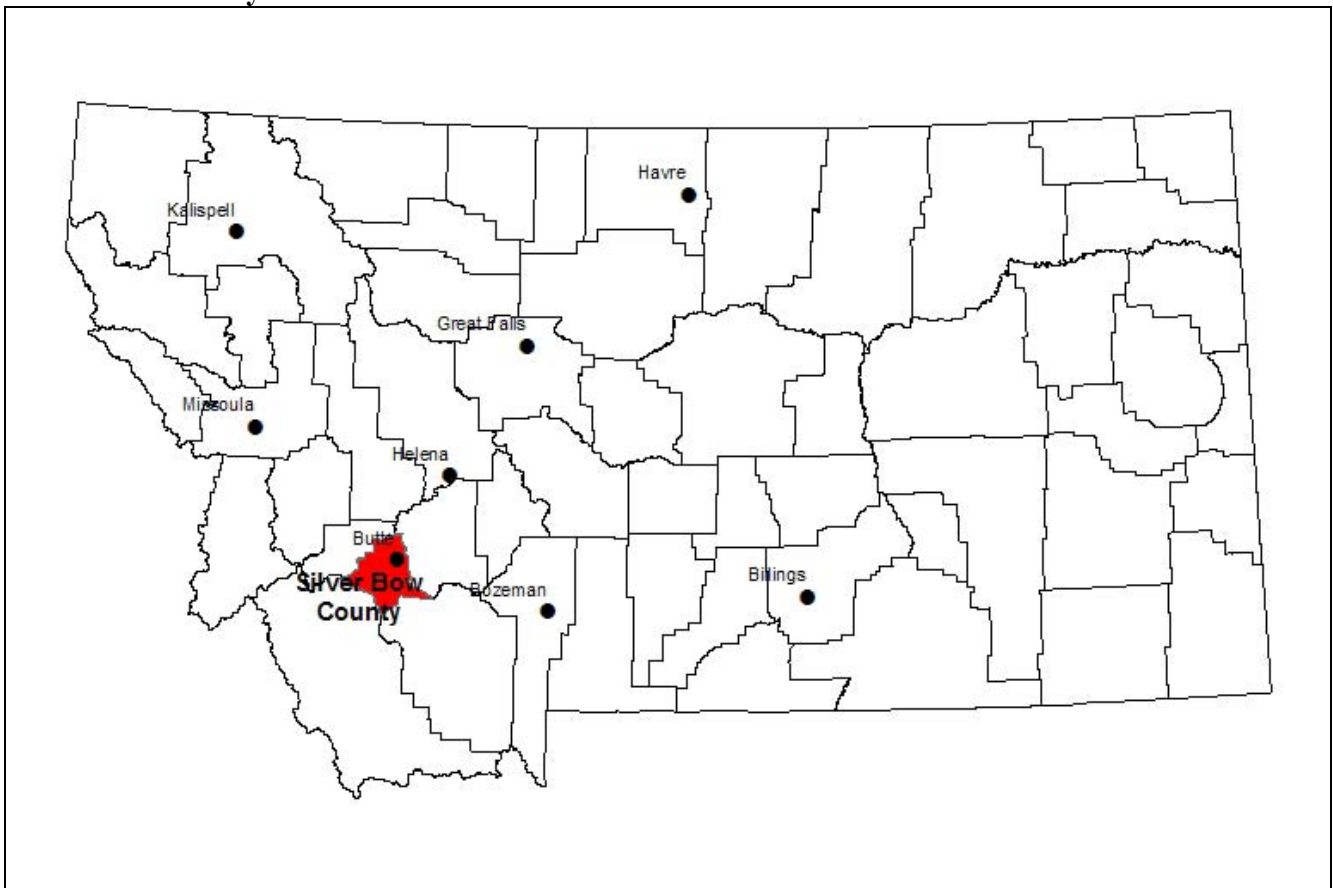
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Introduction

Silver Bow County, Montana is taking the steps necessary to become a disaster resistant community, and through their initiative, received a Pre-Disaster Mitigation grant from the Federal Emergency Management Agency (FEMA) through Montana Disaster and Emergency Services (MT DES) to create a Hazard Mitigation Plan. This plan is to meet the requirements of the Interim Final Rule published in the Federal Register on February 26, 2002 at 44 CFR Part 201 as part of the Disaster Mitigation Act of 2000. The plan's intent is to assist the community in making financial decisions for mitigation projects and clarify actions that could be taken through additional funding. Hopefully through the planning process, the community has become more aware of its hazards and will continue to take a proactive approach to disaster prevention.

Silver Bow County is located in Southwest Montana as shown in the map below with a population of 33,604 based on 2000 US Census data with an area of 718 square miles. Silver Bow County has the incorporated community of Walkerville and the consolidated city-county government of Butte-Silver Bow. Butte-Silver Bow's jurisdiction includes the communities of Butte, Centerville, Divide, Gregson/Fairmont, Melrose, Nissler, Ramsay, and Rocker. The most urbanized area of Butte serves as the county seat. A map representing Silver Bow County's population density can be found on the map titled Population Density in Appendix A.

Silver Bow County's Location Within Montana



The Butte area is well known for its history of mining. Once called the “Richest Hill on Earth”, Butte became a center for mining and industry during the late 1800’s to early 1900’s. The mining business

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continued at a fast pace until the early 1980's when copper prices dropped. Estimates are that about \$22 billion of metals have been mined from the Butte area. Uptown Butte is now part of a National Historic Landmark District with over 4,500 buildings. This rich history has not come without problems, however, and some of the related hazards, such as near surface ground control failure, are addressed in this plan. The industry and mining during the early to mid 1900's led to water contamination problems and the Environmental Protection Agency (EPA) is actively working in the County through its Superfund program. A map of the Superfund sites can be found in Appendix A on the map titled Superfund Sites.

The climate of Silver Bow County makes it quite prone to many weather-type natural hazards. Over the past 30 years at the airport in Butte, temperatures have ranged between -52 and 100 degrees Fahrenheit. In an average year, 232 days drop to or below freezing (32 degrees Fahrenheit), and about 40 days report thunderstorms. Butte receives about 57 inches of snow and 13 inches of precipitation (liquid equivalent) in an average year. In contrast, the weather reporting station near Divide averages about 41 inches of snow each year and 12 inches of precipitation (liquid equivalent). Winter storms, flooding, drought, heat waves, wind, and severe thunderstorms can all affect Silver Bow County.

The geology of Silver Bow County also puts the communities at risk for geological hazards. Butte sits at an elevation of roughly 5,700 feet above sea level. The County has mountainous terrain with the Continental Divide passing through the middle of it. Elevations range from 4,430 to 10,223 feet above sea level. Earthquakes have been known to shake the area and rocky slopes throughout the County present avalanche and landslide hazards. With much of the County covered by National Forest lands combined with the arid climate, wildfires can also become a problem.

Urban development during the mining boom in the 1900's created the urban area of Butte that now presents several man-made hazards including hazardous materials, civil unrest, structure fires, and terrorism. An analysis of each of these hazards and others is presented in the risk assessment.

Planning Process

The planning process used in developing this Hazard Mitigation Plan attempted to maximize community input and utilize a wide variety of informational resources. The planning process began in July 2003 with an advertised public meeting that was held in conjunction with the regularly scheduled Local Emergency Planning Committee (LEPC). The LEPC consists of representatives from emergency management, fire services, medical and health services, law enforcement, planning, education, airport management, government administration, community development, veterinary services, utilities, and the private sector. This already active committee was determined to be an excellent core group because of its broad representation. Attendance records can be found in Appendix C.

The first public meeting was advertised through a public notice in The Montana Standard newspaper and press releases to local radio and television stations. Members of the media attended this first meeting and several stories and interviews were run on the local television stations with information on how the public could be involved. This first public meeting introduced the attendees to the planning process and mitigation strategies. Handout materials can be found in Appendix D. The group then identified the primary hazards in the County and participants were surveyed on their individual hazard mitigation prioritizations.

The second public meeting in August 2003 was advertised through another public notice in The Montana Standard newspaper. Despite many attempts by the media encouraging public involvement, very little interest was generated. The LEPC members continued to attend the meetings and participate, however, members of the public-at-large did not attend. At the second meeting, subject matter experts and interested parties were identified for each of the hazards. These hazard reviewers were then sent draft copies of their given hazard's profile for comments and further development. In most cases, the hazard profiles were modified to reflect local knowledge. Additional small group and individual meetings that focused on specific hazards also took place.

At the October 2003 LEPC meeting, members and attendees were presented with initial vulnerability assessment and hazard ranking information. Discussions were held regarding this information and its accuracy for Silver Bow County. To follow up, members were then sent lists of the identified critical facilities and ideas for the mitigation strategy development. Members and attendees of the December 2003 meeting were then presented with the mitigation goals and objectives that were developed based comments received during the planning process.

A final public meeting was held on January 29, 2004 where a presentation outlining the plan's contents was given. Several items were discussed, agreed upon, and incorporated into this final plan document. The Big Sky Hazard Management website also displayed the plan and provided an e-mail address and telephone number for comments. A link to this website was posted on the Butte-Silver Bow government website. The comment period continued until February 15, 2004, and those comments received were also incorporated into the plan where appropriate.

Risk Assessment

Overview:

Silver Bow County is exposed to many hazards both natural and man-made. The hazards were identified and profiled through several different means. A history of past events was gathered and possible future events were recognized through internet research, available GIS data, public meetings, subject matter experts, County archives, and examination of existing plans. Of particular use was the Hazard Vulnerability Analysis done in 1984 for the City-County Emergency Operations Plan by the Disaster and Emergency Services office.

The hazards (in alphabetical order) have been identified as follows in Table 5-1. The level of detail for each hazard is based on the relative risk of each hazard to the community and is limited by the amount of data available.

Table 5-1

Hazards Identified in Silver Bow County, Montana		
Hazard	How Identified	Why Identified
Avalanche	<ul style="list-style-type: none">• State DES Website• BSB Search and Rescue Records• State Hazard/Vulnerability Assessment	<ul style="list-style-type: none">• Mountainous terrain exists that may be prone to avalanches
Aviation	<ul style="list-style-type: none">• Input from planning/public meetings• Research of FAA database• 1984 Butte-Silver Bow Hazard Vulnerability Assessment	<ul style="list-style-type: none">• Close proximity of an airport serving commercial flights to the urban areas• History of incidents with several casualties
Blight & Drought	<ul style="list-style-type: none">• Montana Drought Advisory Committee website• National Drought Mitigation Center website• Data from the Western Regional Climate Center• State DES website• NOAA Paleoclimatology Program website• 1984 Butte-Silver Bow Hazard Vulnerability Assessment	<ul style="list-style-type: none">• Frequent historical drought events• USDA Disaster Declarations• Relationship to wildfire danger

Table 5-1 (continued)

Hazards Identified in Silver Bow County, Montana		
Hazard	How Identified	Why Identified
Communicable Disease & Bioterrorism	<ul style="list-style-type: none"> • Input from planning/public meetings • Montana Department of Livestock website • Center for Disease Control website • Butte-Silver Bow Health Department information • 1984 Butte-Silver Bow Hazard Vulnerability Assessment 	<ul style="list-style-type: none"> • History of an influenza outbreak during the 1910's • New emerging diseases such as SARS and West Nile Virus • Rapid disease spread potential through urban areas
Dam Failure	<ul style="list-style-type: none"> • National Inventory of Dams website • Silver Bow County DES • Basin Creek Dams #1 and #2 Emergency Action Plan 	<ul style="list-style-type: none"> • High hazard dams within the County • County ownership of other hazard dams
Earthquake	<ul style="list-style-type: none"> • Montana Bureau of Geology and Mines publications and website • Subject matter expert input • USGS National Seismic Hazard Mapping Project website • University of Utah Seismograph Stations website • USGS National Earthquake Information Center website • State DES website • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • Yankee Doodle Tailings Dam Seismic Evaluation 	<ul style="list-style-type: none"> • Two known faults within the County • History of nearby earthquakes greater than 6.0 magnitude • Related to potential hazardous materials incidents • Presence of a significant number of older buildings that may not meet seismic standards in the County
Extended Cold & Winter Storms	<ul style="list-style-type: none"> • Data from the Western Regional Climate Center • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • Input from subject matter expert 	<ul style="list-style-type: none"> • Frequent winter storms and extreme cold temperatures each season • Potential for power outages during a cold spell
Flooding	<ul style="list-style-type: none"> • FEMA Flood Study and FIRM review • 1984 Butte-Silver Bow Hazard Vulnerability Assessment 	<ul style="list-style-type: none"> • Big Hole River in the southern part of the County • Several creek and streams run through the County • History of urban flooding • Presidential declaration for flooding in 1981

Table 5-1 (continued)

Hazards Identified in Silver Bow County, Montana		
Hazard	How Identified	Why Identified
Hazardous Materials & Water Pollution	<ul style="list-style-type: none"> • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • Records from BSB DES 	<ul style="list-style-type: none"> • Hazardous materials are frequently transported through the County • Several fixed facility hazardous material sites exist • History of frequent spills and leaks
Heat Wave	<ul style="list-style-type: none"> • Data from the Western Regional Climate Center 	<ul style="list-style-type: none"> • Potential for power outages during a heat wave • Increased potential for train derailments
Landslide	<ul style="list-style-type: none"> • USGS National Study 	<ul style="list-style-type: none"> • The County has an area of landslide incidences and susceptibility
Near Surface Ground Control Failure & Subsidence	<ul style="list-style-type: none"> • Input from planning/public meetings • Data collected by the EPA • Subject matter expert input 	<ul style="list-style-type: none"> • Existence of hundreds of abandoned mines throughout the County and urban areas • History of collapsing mine workings
Strike & Civil Unrest	<ul style="list-style-type: none"> • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • Subject matter expert input • Historical records from BSB DES 	<ul style="list-style-type: none"> • Large, populated events in the County each year • Strong union presence in the communities • Historical strike events
Structure Fires	<ul style="list-style-type: none"> • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • BSB DES Records • Newspaper Records 	<ul style="list-style-type: none"> • Large historical urban blocks of commercial structures • Long history of significant structure fires
Terrorism & Violence	<ul style="list-style-type: none"> • 1984 Butte-Silver Bow Hazard Vulnerability Assessment • Subject matter expert input 	<ul style="list-style-type: none"> • Little protection of hazardous materials and critical facilities • Heightened alert since September 11, 2001 • Large populated events in the County each year
Volcanic Ash	<ul style="list-style-type: none"> • State DES website • 1984 Butte-Silver Bow Hazard Vulnerability Assessment 	<ul style="list-style-type: none"> • Proximity to active volcanoes that could deposit ash over the County • History of volcanic ash from Mt. St. Helens
Wildfire	<ul style="list-style-type: none"> • USFS National Fire Plan • Subject matter expert input 	<ul style="list-style-type: none"> • History of wildfires • Growth in the urban wildland interface • Mountainous, forested terrain exists throughout the County

Table 5-1 (continued)

Hazards Identified in Silver Bow County, Montana		
Hazard	How Identified	Why Identified
Wind & Severe Thunderstorms	<ul style="list-style-type: none"> National Weather Service website National Climatic Data Center website Subject matter expert input 	<ul style="list-style-type: none"> Severe thunderstorms and tornadoes have occurred in the past

Assets and Community Inventory

An important piece of assessing the risk of the community to the studied hazards is to identify what assets are more vulnerable to those hazards than others. Those facilities that are considered vital to the community such as law enforcement, fire services, health services, communications, hazardous materials storage, and other government services have been identified as **critical facilities**. Two tiers of critical facilities have been developed for prioritization. Each facility is assigned priority one or two based on the needed commodity or protection that facility provides. Facilities housing particularly vulnerable populations such as nursing homes for the elderly, schools, jails, and shelters are also considered to be critical facilities. These facilities have been identified by the Local Emergency Planning Committee and through additional research including significant information on vulnerable populations obtained from the Big Hole Sub-Area Contingency Plan.

The critical facilities owned by the local government are also outlined in more detail in Table 5-2 through Table 5-17 in terms of their locations and values. The size, replacement value, and contents values were collected where readily available. Time and resource constraints prohibited the collection of all values for all structures. Future development of this plan may allow for a more in-depth analysis.

Table 5-2

Critical Facilities – Private Hazardous Materials Sites (Priority One)*							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value (\$)	Source of Info.	GPS	Notes
AsiMI	119140 Rick Jones Way	TBD	TBD	TBD	LEPC	Yes	Silane, Ammonia, Hydrogen, Nitrogen

** Identified using EPA Chemical Thresholds*

Table 5-3

Critical Facilities – Local Government Facilities (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value (\$)	Source of Info.	GPS	Notes
BSB Courthouse	155 W. Granite, Butte	101,653	\$19,503,873	\$797,400	LEPC, Insurance Records	Yes	
Walkerville Town Hall	40 W. Daly, Walkerville	3,600	\$500,000	\$40,000	Walkerville Mayor	No	
Walkerville Town Garage	204 W. Daly, Walkerville	2,800	\$250,000	\$274,000	Walkerville Mayor	No	Contents value includes vehicles housed there

Table 5-4

Critical Facilities – Local Government Facilities (Priority Two)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value (\$)	Source of Info.	GPS	Notes
BSB Archives	17 W. Quartz, Butte	12,658	\$100,000	\$1,000,000	Insurance Records	No	
BSB Civic Center	1340 Harrison Ave., Butte	46,005	\$5,852,800	\$450,800	Insurance Records	No	
BSB Health Offices	25 W. Front St., Butte	20,008	\$1,203,049	\$22,800	Insurance Records	No	
BSB Welfare Offices	700 Casey St., Butte	TBD	TBD	TBD	Internet Research	No	

Table 5-5

Critical Facilities – Local Water and Sewer Facilities and Storage (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value (\$)	Source of Info.	GPS	Notes
Metro Sewer Treatment Plant	800 Centennial Ave., Butte	20,000	\$1,000,000	\$15,860,800	LEPC, Insurance Records	Yes	
Butte Water Utility Division/ Public Works Bldg	124 W. Granite, Butte	8,925	\$652,577	\$108,400	LEPC, Insurance Records	Yes	
Water Dispatch Bldg	129 W Galena	4,175	\$180,570	\$23,800	Insurance Records	No	
Moulton Reservoir #1	5.5 miles north of Walkerville	N/A	N/A	N/A	LEPC	Yes	224 MG full pool capacity
Moulton Reservoir #2	5.5 miles north of Walkerville (approx.)	N/A	N/A	N/A	LEPC	Yes	11.6 MG full pool capacity
Moulton Water Treatment Plant	2297 North Main St., Walkerville	12,700	\$1,857,900	\$4,444,751	LEPC, Insurance Records	Yes	Clear well capacity of 0.3 MG, 1100 gallons of hypo chlorite solution
Basin Creek Dam #2	10 miles south of Butte	N/A	N/A	N/A	LEPC	Yes	Approx. 10-12 MG
Basin Creek Dam #1 (Pumps & Controls Building)	10 miles south of Butte	330	\$70,000	\$0	LEPC, Insurance Records	Yes	363.5 MG capacity, 4-2000 lb containers of chlorine
Big Hole Water Treatment Facility	847 Divide Creek Rd.	28,800	\$2,732,256	\$14,771,704	LEPC, Insurance Records	Yes	Clear well capacity of 0.6 MG, 8-2000 lb containers of chlorine
South Fork Reservoir	SW of Big Hole Water Treatment Plant	N/A	N/A	N/A	LEPC	Yes	13.47 MG capacity
Big Hole Pump Station	3.5 miles west of Divide	13,975	\$325,897	\$2,174,103	LEPC, Insurance Records	Yes	
Big Hole Intake Station	Big Hole River	N/A	\$2,000,000	N/A	Public Works	No	
High Service Reservoir	Bull Run Gulch Road	N/A	\$1,535,812	N/A	Public Works	No	2.5 MG capacity

Table 5-5 (continued)

Critical Facilities – Local Water and Sewer Facilities and Storage (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value (\$)	Source of Info.	GPS	Notes
West Side Pump Station	1501 N. Excelsior	4,671	\$333,790	\$166,210	Insurance Records	No	
West Side Water Tank	1100 Lexington	N/A	\$1,034,750	N/A	LEPC, Insurance Records	Yes	5 MG capacity
Colorado Hill Tank	400 Greenwood	N/A	\$3,000,000	N/A	LEPC, Value Estimates	Yes	9 MG capacity

Table 5-6

Critical Facilities – Local Water and Sewer Facilities and Storage (Priority Two)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value(\$)	Source of Info.	GPS	Notes
Ramsay Pump House		2,400	TBD	TBD	LEPC	Yes	Industrial use only
TIFID Pump Station		3,024	TBD	TBD	LEPC	Yes	Industrial use only
Silver Lake	West of Anaconda (outside the County)	N/A	N/A	N/A	LEPC	Yes	Industrial use only, 5.58 BG storage, 2.78 BG operating volume
Storm Lake	West of Anaconda (outside the County)	N/A	N/A	N/A	LEPC	Yes	969 MG storage, 661.8 MG operating volume

Table 5-7

Critical Facilities – Local Correctional Facilities (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value(\$)	Source of Info.	GPS	Notes
Community Correction Parole & Probation	66 W. Broadway	TBD	TBD	TBD	LEPC	Yes	
BSB Law Enforcement Agency & 911 Center	225 N. Alaska	21,603	\$2,062,335	\$958,434	LEPC, Renovation Coordinator	No	
BSB Jail	Warm Springs (Outside the County)	TBD	TBD	TBD	LEPC	No	To change in 2004 upon completion of new jail.
Children's Comprehensive Services of Montana	55 Basin Creek Rd.	TBD	TBD	TBD	LEPC	Yes	

Table 5-8

Critical Facilities – Fire Stations (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value(\$)	Source of Info.	GPS	Notes
Big Butte Fire Station	907 Lexington	1,973	\$105,220	\$44,780	LEPC, Insurance Records	Yes	
Boulevard Fire Station	1900 Franklin	3,837	\$159,273	\$90,727	LEPC, Insurance Records	Yes	
North Fire Station	120 S. Idaho	20,025	\$1,317,732	\$75,000	LEPC, Insurance Records	Yes	
South Fire Station	1901 Harrison	5,057	\$372,179	\$12,000	LEPC, Insurance Records	Yes	
Centerville Fire Station	30 E. Center	1,950	\$93,550	\$17,200	LEPC, Insurance Records	Yes	
Floral Park Fire Station	3000 State	960	\$48,576	\$7,200	LEPC, Insurance Records	Yes	
Home Atherton Fire Station	3900 Sheridan	2,928	\$200,000	\$140,210	LEPC, Insurance Records	Yes	
Little Basin Creek Fire Station	617 Little Basin Creek Road	1,350	\$67,340	\$185,000	LEPC, Insurance Records	Yes	
Melrose Fire Station	285 Broad St., Melrose	TBD	TBD	TBD	LEPC	No	
Racetrack Fire Station	2344 Grand	6,144	\$202,500	\$92,000	LEPC, Insurance Records	Yes	
Rocker Fire Station	1110 Grizzly Trail	2,250	\$117,160	\$28,500	LEPC, Insurance Records	No	
Terra Verde Fire Station	143 Janney Rd.	1,900	\$80,000	\$102,000	LEPC, Insurance Records	Yes	
Walkerville Fire Station	40 W. Daly Walkerville	1,389	\$140,000	\$260,000	LEPC, Walkerville Mayor	Yes	Contents value includes the vehicles there.

Table 5-9

Critical Facilities – Communications Facilities (Priority One)							
Name	Address	Size (sq. ft)	Replacement Value (\$)	Contents Value(\$)	Source of Info.	GPS	Notes
KBOW/KOPR Radio Station	660 Dewey Blvd.	TBD	TBD	TBD	LEPC	Yes	Primary EAS Station
XL Heights Government Satellite Transmission	East Ridge	TBD	TBD	TBD	LEPC	Yes	FAA, FBI, BSB Public Works, EMS, Cellular Phone
Qwest Trunking Station	216 W. Broadway	TBD	TBD	TBD	LEPC	Yes	
Red Mountain Tower	Red Mountain	TBD	TBD	TBD	LEPC	Yes	BSB Sheriff, USFS, MT DOT, MHP, BSB Water Division, BSB DES
BSB Public Works Dispatch	1700 Civic Center Rd.	58,950	\$1,811,000	\$136,900	LEPC, Insurance Records	Yes	Shops 1,2, & Maintenance

Table 5-10

Critical Facilities – Communications Facilities (Priority Two)				
Name	Address	Source of Information	GPS	Notes
KXTL Radio Station	750 Dewey Blvd.	LEPC	Yes	
KMSM Radio Station	MT Tech Campus	LEPC	Yes	
KTVM Television Station	750 Dewey Blvd.	LEPC	Yes	
KXLF Television Station	1003 S. Montana	LEPC	Yes	
KWYB Television Station	505 W. Park	LEPC	Yes	
AT&T Broadband	201 E. Front	LEPC	Yes	
Cellular One Tower	S. Montana	LEPC	Yes	
Horizon Cellular Tower	N. Excelsior, Walkerville	LEPC	Yes	
Touch America Hub	Main & Granite Streets	LEPC	Yes	

Table 5-11

Critical Facilities – Energy Facilities (Priority One)*				
Name	Address	Source of Information	GPS	Notes
Northwestern Energy Substation	400 Oxford	LEPC	Yes	
Northwestern Energy Substation	Pacific St.	Public Comment	No	
Northwestern Energy Substation	Cora Substation near Granite Mt. Memorial	Public Comment	No	

** Other critical facilities are owned by Northwestern Energy but due to security sensitivities those locations have not been made available for this plan. In the future, Northwestern Energy may develop its own annex to this plan.*

Table 5-12

Critical Facilities – Transportation Facilities (Priority One)				
Name	Address	Source of Information	GPS	Notes
Bert Mooney Airport	111 Airport Rd.	LEPC	Yes	

Table 5-13

Critical Facilities – Transportation Facilities (Priority Two)				
Name	Address	Source of Information	GPS	Notes
Bus Terminal	101 E. Front St.	LEPC	Yes	
Rarus Railroad Switch Yard	W.T. McCarthy	LEPC	Yes	
Port of Montana	119041 German Gulch	LEPC	Yes	

Table 5-14

Critical Facilities – State Facilities				
Name	Address	Source of Information	GPS	Notes
Montana National Guard	600 Gilman, Butte	LEPC	Yes	
Montana Department of Transportation	3751 Wynne, Butte	LEPC	Yes	District Office
Montana Highway Patrol	3615 Wynne, Butte	LEPC	Yes	

Table 5-15

Critical Facilities – Federal Facilities				
Name	Address	Source of Information	GPS	Notes
US Federal Courthouse	400 N. Main St.	LEPC	Yes	
US Post Office	701 Dewey Blvd., Butte	LEPC	Yes	Main Office
US Post Office	60 W. Galena, Butte	LEPC	Yes	
US Post Office	Divide	LEPC	Yes	
US Post Office	Melrose	LEPC	Yes	
US Post Office	Ramsay	LEPC	Yes	
US Forest Service	1820 Meadowlark Ln.	LEPC	Yes	Butte District Ranger
US Bureau of Land Management	106 N. Parkmont	LEPC	Yes	
US Environmental Protection Agency	155 W. Granite	LEPC	Yes	
US Social Security Offices	2201 Harrison Avenue	LEPC	Yes	

Table 5-16

Vulnerable Populations – Hospitals and Nursing Homes				
Name	Address	Source of Information	GPS	Notes
Continental Gardens	100 Gardens Way	Big Hole Plan	No	
Belmont Senior Center	315 E. Mercury	Big Hole Plan	No	15,000 sq. ft., \$1.5M replacement, \$50,000 contents
Montana Surgery Center	840 S. Montana	Big Hole Plan	No	
St. James Healthcare Hospital	400 S. Clark St.	LEPC	Yes	100 beds, can run for 3 weeks on generator power, replacement value for structure and contents is \$120,429,460
Rocky Mountain Clinic (Express Care)	1101 S. Montana St.	Big Hole Plan	No	
Russell Meech – Rehab Works	2400 Continental Dr.	Big Hole Plan	No	
Crest Nursing Home	3131 Amherst Ave.	LEPC	Yes	103 beds
Marquis Vintage Suites Assisted Living	415 Mount Highland Dr.	Big Hole Plan	No	60 clients
Waterford on Elizabeth Warren	3701 Elizabeth Warren St.	Big Hole Plan	No	80 clients
Butte Convalescent Center	2400 Continental Dr.	Big Hole Plan	No	
Beyond Home	2900, 2920, 2930 Elm St.	Big Hole Plan	No	33 clients
Evergreen Butte Health and Rehab	3251 Nettie	Big Hole Plan	No	186 beds
Montana Chemical Dependency Center	2500 Continental Dr.	Big Hole Plan	No	

Table 5-17

Vulnerable Populations – Schools				
Name	Address	Source of Information	GPS	Population
Butte Special Education	1050 S. Montana	Big Hole Plan	No	Population varies
Butte High School	401 S. Wyoming	LEPC	Yes	1,660 students
Central Junior High School	1100 Delaware	Big Hole Plan, DES	No	103 students
Butte Central High School	9 S. Idaho	Big Hole Plan, DES	No	142 students
Butte Christian School	45 W. Greenwood Ave.	Big Hole Plan, DES	No	35 students
East Middle School	2600 Grand Ave.	LEPC	Yes	797 students
Sylvan Learning	1941 Harrison Ave.	Big Hole Plan	No	Population varies
Math Place	1460 Holmes Ave.	Big Hole Plan	No	Population varies
Emerson Elementary School	1924 Phillis Ave.	LEPC	Yes	318 students
Hillcrest Elementary School	300 Continental Dr.	LEPC	Yes	402 students
Kennedy Elementary School	Hornet and Emmett	LEPC	Yes	334 students
Margaret Leary Elementary School	Four Mile Vue	LEPC	Yes	313 students
West Elementary School	800 S. Emmett	LEPC	Yes	406 students
Whittier Elementary School	Princeton and Sherman	LEPC	Yes	515 students
Central Elementary School	1100 Delaware	Big Hole Plan, DES	No	197 students
Divide Elementary School K-8	PO Box 9, School House, Divide	Big Hole Plan, DES	No	15 students
Melrose Elementary School K-8	PO Box 128 Hecla St., Melrose	Big Hole Plan, DES	No	16 students
Ramsay Junior High School 7-8	3 Russell St., Ramsay	DES	No	31 students
Ramsay Elementary School K-6	3 Russell St., Ramsay	Big Hole Plan, DES	No	97 students
Montana Tech of the University of Montana	1300 W. Park St. & 25 Basin Creek Rd.	Big Hole Plan, DES	No	2,116 students 326 staff

In addition to the critical facilities, residences, businesses, and other facilities are also vulnerable to these hazards. Based on 2000 US Census Data, the population of Silver Bow County is 33,604 with 16,176 housing units. The median value of those owner-occupied housing units is \$74,900. Also, 1,151 private, non-farm establishments and 1,986 non-employer establishments exist. A further breakdown of the housing units can be found in Table 5-18.

Table 5-18

2000 US Census Housing Data	
Units in Structure	Number
1-unit, detached	11,281
1-unit, attached	279
2 units	702
3 or 4 units	664
5 to 9 units	592
10 to 19 units	338
20 or more units	740
Mobile home	1,570
Boat, RV, van, etc.	10

Table 5-17 (continued)

2000 US Census Housing Data	
Year Structure Built	Number
1999 to March 2000	126
1995 to 1998	780
1990 to 1994	452
1980 to 1989	907
1970 to 1979	2,384
1960 to 1969	1,373
1940 to 1959	3,598
1939 or earlier	6,556
Value	Number
Less than \$50,000	1,985
\$50,000 to \$99,999	4,034
\$100,000 to \$149,999	1,347
\$150,000 to \$199,999	569
\$200,000 to \$299,999	251
\$300,000 to \$499,999	43
\$500,000 to \$999,999	0
MEDIAN	\$74,900

Using this census data, the total value of residential structures in Silver Bow County can be estimated at \$1,211,582,400 (16,176 housing units * \$74,900/unit).

In terms of infrastructure, very limited data exists outlining the specific infrastructure within the County. Electric transmission and natural gas lines are operated by Northwestern Energy and telephone lines are operated by Qwest. Both are present throughout the County, however, due to security concerns, specific locations are not identified in this plan. Several cellular telephone towers are also present and are owned by various entities. Most roads and bridges within and near Butte are paved. Outside roads, however, frequently are gravel.

Butte has an extensive public water and sewer system and many of those operating facilities are listed in the critical facilities. An important vulnerability of the public water system is that the water cannot be processed without electricity, therefore, a power outage caused by any of the hazards could present drinking water problems. A map of the public water utilities can be found on the map in Appendix A titled Water and Sewer.

Land Use and Future Development

Silver Bow County is the smallest county in Montana, with respect to area, at 718 square miles. Silver Bow County, however, is also the densest county in Montana. Butte-Silver Bow City-County adopted a Growth Policy in 1995 as part of the Butte-Silver Bow Master Plan. Public involvement was used extensively in the plan's development through public meetings. Much of the information for this section was derived from that policy.

According to the Butte-Silver Bow Growth Policy, approximately 56% of the land area is federally or state owned with 44% privately owned. Only 8.5% of the total area in the County is considered to be developed with urban, industrial, or mining uses. That leaves 91.5% of the County undeveloped. Of the privately owned lands, roughly 10.4% make up the urban corridor of Butte, with 0.4% part of the unincorporated rural centers of Rocker, Ramsay, Melrose, Divide, and Gregson/Fairmont. The remainder of privately owned lands have other land uses, primarily grazing and timber.

In terms of population growth, Silver Bow County experienced extremely explosive growth in the early 1900's peaking at just over 60,000 people. In recent years, however, the population has remained fairly steady at about 34,000 people.

Butte-Silver Bow does have a Zoning Ordinance of which approximately 98% of the urban corridor of Butte and 437 acres outside of the urban corridor are regulated according to the Butte-Silver Bow Growth Policy. The zoning classifications include suburban residential, residential, commercial, and industrial areas, each with additional sub-classifications. Most new housing construction, as identified in the Growth Policy, has occurred as single family detached dwellings, particularly in the urban fringe and suburban areas of East Ridge, Country Club, Blacktail, and Basin Creek. Some new construction has also occurred south of Rocker and Ramsay and southeast of Gregson/Fairmont. An increase in manufactured home units was also an identified trend for new construction according to the Growth Policy.

Chapter V of the Butte-Silver Bow Growth Policy acknowledges that the Master Plan was designed to encourage growth, however, the Policy has also recognized the following limiting factors:

- *Naturally Restricting Factors – areas of excessive slope, flood plains, and sites that are subject to seismic activity.*
- *Man-made Constraints – facilities such as the airport, railroads, highways, solid and liquid waste disposal, mining activities, and other development which may be hazardous or obnoxious to the living environment.*
- *Landownership Patterns – Since approximately 58% of the total land area in the County is under Federal or State ownership, opportunities to use these properties for new development are greatly reduced or prohibited.*

All building permits issued by Butte-Silver Bow City-County are reviewed with respect to the Master Plan and Growth Policy. Development in hazardous areas as identified by the Master Plan is prohibited or held to the highest building standards.

The Town of Walkerville currently does not have a formal growth plan, however, a land use plan has been developed. Much of the available land for development will depend on land availability after the Superfund project is completed. The current land use plan designates the south central and southwest part of Walkerville as Urban Residential, the north central and northwest part of Town as Rural 2 Residential, the northeast section as Industrial, and the southeast corner as open space. The majority of the land is within the residential categories. Once the Superfund project is completed, a revised land use and growth plan may be developed.

Vulnerability Assessment Methodology

A Hazard Vulnerability Analysis was initiated in 1983 by the Butte-Silver Bow Chief Executive and completed by 1984. This analysis defined each of the hazards and for each hazard, compiled a rough history, looked at the vulnerability of the community, created a maximum threat scenario, and estimated a probability. The analysis was a good starting block for this assessment, however, it did not include all of the hazards that are presently identified, and the vulnerabilities were not analyzed in the detail needed. This previous Hazard Vulnerability Analysis will be referred to frequently in this plan and considered; however, the methodology used here will not be exclusively limited to that which has been used in the past.

Those hazards with available GIS data were analyzed through mapping by the Butte-Silver Bow GIS department. This department created most of the maps contained in this plan and can be contacted to clarify any questions on the data used.

Structure losses have been determined using the structure data available to the Butte-Silver Bow's GIS department. The data used to identify the number of structures in the hazard area was only available for parts of the County. In some instances, structures in the outlying areas were estimated using a population density map. Data for various hazard areas, such as the floodplain, were also used when available in digital format. Whenever possible, the hazard area is overlaid on the structure data to determine the number of structures that lie within that hazard area. The value of those structures are then estimated using the median structure value of \$74,900 as determined by the 2000 census data multiplied by the number of structures in the hazard area. In most cases, the dollar values are multiplied by a damage factor since many events will not result in a complete loss of all structures. Frequently, only parts of the hazard area are affected or structures don't suffer a complete loss and may have only minor damage. These figures, of course, will only represent estimates but are based on current hazard data.

Critical facilities will also be analyzed individually based on the hazard information available. Whenever possible, losses were estimated based on factors listed in the FEMA *State and Local Mitigation Planning How-to Guide: Understanding Your Risks*.

The population impacts were qualitatively assessed based on the percentage of the population estimated to have residences in the hazard area and the general warning time that could be expected. The loss of life and possible injuries are difficult to determine and would be dependent on the time of day, event location, and hazard specific circumstances.

Hazards were ranked based on a hazard vulnerability analysis very similar to the one done in 1984 and the results from a participant survey. A survey on the probability of a disaster for each hazard and the associated impacts was distributed and collected during a public meeting. The survey results can be found in Appendix D. This survey also allowed participants to rank the hazards for mitigation action. A copy of the handout can also be found in Appendix D. This ranking, in conjunction with the risk assessment, was used to develop mitigation goals for this plan.

AVALANCHE

When snow accumulations on a slope cannot be supported any longer, the snow support structure may break and fall creating an avalanche. The subsequent rush of unsupported snow can bury and move things in its path. The majority of avalanches do not cause any damage; occasionally however, people and property may fall in their paths.

Avalanches have been identified as a hazard by the State DES office. Given the terrain of Silver Bow County, avalanches can occur. According to the State DES website, "If it is assumed that an accumulation of snow is possible anywhere in Montana, then we can evaluate the potential for hazard solely on the basis on terrain characteristics. The most important factor by far is terrain steepness. Wet snow avalanches can start on slopes of 20 degrees or less, but the optimum slope angle for avalanche starting zones is 25-45 degrees. Slopes steeper than 45 degrees will not normally retain enough snow to generate large avalanches, but they may produce small sluffs that trigger major avalanches on the slopes below. Therefore, all slopes of 20 degrees and greater should be considered as potential avalanche sites."

The Colorado Avalanche Information Center has compiled statistics on a statewide basis on avalanche fatalities. Montana ranks fifth in the nation with over 50 fatalities from 1950/51 to 2000/01. Looking at the activities the individuals were undertaking at the time of the avalanche, climbing, backcountry skiing, and snowmobiling rank as the top three.

A map titled Vulnerability to Avalanches in Montana published in the Montana Hazard/Vulnerability Analysis in 1987 shows the general areas within Montana that are considered vulnerable to avalanches. In Silver Bow County, the map shows areas of moderate avalanche vulnerability along the eastern edge of the County extending to the south and southwest of Butte. Another area of moderate avalanche vulnerability is found across the western quarter of the County. These areas generally coincide with US Forest Service lands. A map for the wildfire section titled Wildfire, Water & Air Quality in Appendix A shows the areas within Silver Bow County owned by government entities.

Historically, Silver Bow County has not suffered an avalanche resulting in major damages. Therefore, historical data does not exist that can be used to predict future losses. Digital mapping of this hazard has also not been developed to date. In neighboring Beaverhead County, avalanche deaths have occurred near the County line. One snowmobiler was killed and others were injured about 12 miles west of Melrose in the Pioneer Mountains on March 23, 1975. Butte-Silver Bow Search and Rescue was actively involved in this recovery. Another incident in Hecla demolished a house and killed five people in 1893.

Avalanche Vulnerability

Since avalanches have not caused structural damages in Silver Bow County to date and the avalanche vulnerability areas generally coincide with National Forests and other government lands, the County is assumed to have little vulnerabilities to structures. The potential exists, however, for people using the mountainous areas to encounter avalanches. Some probability warning capabilities exist for avalanches, however, some individuals may not receive the warnings or may choose to ignore them. Loss of life is a real possibility. An average of one fatality per year over the past 50 years has been

found across the entire state, and therefore, the probability of significant loss of life in any given year in Silver Bow County is extremely low.

AVIATION

The Butte area is primarily served by the Butte Bert Mooney Airport located in Silver Bow County as shown in the map titled Airport Location in Appendix A. At an elevation of 5550 feet, this airport serves approximately 53 flights per day. The majority of these flights are non-commercial, however, several commercial flights arrive and depart Butte each day.

The mountainous terrain of Silver Bow County makes the area particularly hazardous for aircraft. Varying weather conditions and sharp changes in elevation do not allow pilots much flexibility during takeoffs and landings. With the airport's close proximity to Butte and other developed areas, an accident could potentially occur within a populated, downtown area. In addition, the potential exists for an incident involving a passenger aircraft, and therefore, many casualties. An accident involving aircraft passing over the County is also possible.

To date, Silver Bow County has not had any major aviation incidents involving over 25 people, however, some smaller incidents have occurred. Table 5-19 outlines these incidents (obtained from the Hazard Vulnerability Assessment developed in 1984 and a National Transportation Safety Board database).

Table 5-19

Aircraft Incidents in Silver Bow County			
Date	Location	Fatalities	Other Information
11/6/1950 – 8:15AM	East Ridge	21 dead	Northwest Orient Airlines #115
6/8/1958	9 miles East of Butte	3 dead	
3/21/1964	Southeast of Butte	2 dead	
4/17/1971	Sheridan Plane Crash	4 dead	
4/27/1974	Red Mountain	2 dead	Canadian plane
7/25/1976	JC Penney's	3 dead	Cherokee plane
4/1/1980	Red Mountain	2 dead	Montana Power plane

Based on the Hazard Analysis worksheet completed on this hazard in 1984, Silver Bow County has a high history of incidents, a low vulnerability, a low maximum threat, and a medium probability of occurrence (2-9 incidents in 5 years).

Aviation Vulnerability

Without documented structural damages from previous incidents in Silver Bow County, specific structural vulnerabilities are difficult to determine. A small aircraft could potentially destroy one or two structures resulting in approximately \$100,000-\$200,000 with 1-10 casualties. A larger commercial aircraft passing over Butte could certainly cause more damages to structures and result in more fatalities. A larger block area with four or five structures destroyed (approximate value of \$350,000) and 50-100 passenger fatalities could result in a large event. These figures are purely estimates based on average home values and typical airline passenger estimates to show the hazard potential. The magnitude of the event could vary from these figures greatly and would be determined by many factors including the location of impact, size of aircraft, and number of passengers. Little, if any, warning exists for aviation accidents.

All structures and critical facilities are assumed to have the same risk Countywide, however, 1,266 structures are within one mile of the airport, including two critical facilities. These structures could be considered at slightly higher risk since aircraft incidents frequently occur within close proximity to an airport.

BLIGHT & DROUGHT

Infections and infestations of crops in Montana, including Silver Bow County, could threaten the food supply and economy for the County's residents. In addition, infected or dead trees and crops could contribute to wildfire hazards. A large scale event that wipes out a particular or several crops could potentially exhaust the financial resources of the communities. Given the potential for Countywide effects and the lack of data regarding what areas are more vulnerable to blight than others, the entire County is assumed to have the same risk.

Montana is known for its arid climate and Silver Bow County is no exception. The County has been in drought for the past several years based on climate information, drought indices such as the Palmer Index, and drought monitoring at the national level. The State of Montana established a Drought Advisory Committee and developed a Drought Plan to address the hazard. In addition, Butte-Silver Bow has a Drought Committee that provides information to the State Drought Advisory Committee and the public. Information from the National Drought Mitigation Center also identifies Montana as a drought prone state. Based on data since 1894 from the Western Regional Climate Center for the weather observing station in Butte, temperatures can reach 100 degrees Fahrenheit in the summer with extremely low humidities and high winds. Such dry, hot conditions contribute to drought conditions.

Historical information has been obtained from the State DES website and modified to reflect the conditions in Silver Bow County. Known time periods of drought in Silver Bow County are the 1930's, mid 1950's, 1961, 1966, 1977, 1985, and the early 2000's. In the 1930's, the "Dust Bowl" drought affected the State of Montana, including Silver Bow County. This nationwide drought produced erosion problems in the creation of dust storms throughout the State. Again in the mid 1950's, Montana had a period of reduced rainfall, however, Silver Bow County did not suffer as severely as those counties in the eastern and central portions of the state.

Drought struck the Silver Bow County area again in 1961, and by July, the State's Crop and Livestock Reporting Service called it the worst drought since the 1930's. Better conservation practices such as strip cropping were used to lessen the impacts of the water shortages. Five years later in 1966, the entire state was experiencing yet another episode of drought. Although water shortages were not as great as in 1961, a study of ten weather recording stations across Montana showed all had recorded below normal precipitation amounts for a ten month period.

Then in the 1970's, a seven month survey ending in May of 1977 estimated that over 250,000 acres of Montana farmland had been damaged by winds. Inadequate crop cover and excessive tillage practices had resulted in exaggerated soil damage due to low soil moisture. The State of Montana began taking protective measures to conserve water.

Silver Bow County was severely affected by drought again in 1985 and received a federal drought disaster declaration. For a typical 2,500 acre Montana farm/ranch, the operator lost more than \$100,000 in equity over the course of that year. The state's agriculture industry lost nearly \$3 billion in equity.

Presently, Silver Bow County has had drought conditions since 2000 and has received several USDA Disaster Declarations since then. The State of Montana received \$25.1 million in disaster assistance from the Farm Service Agency in 2002 alone. In May of 2003, the State of Montana was also allocated \$2.4 million from the US Department of Agriculture for water conservation and drought

mitigation. This history shows that the County experiences drought almost once every decade and the drought may last for several years.

The National Oceanic and Atmospheric Administration Paleoclimatology Program has studied drought by analyzing records from tree rings, lake and dune sediments, archaeological remains, historical documents, and other environmental indicators to obtain a broader picture of the frequency of droughts in the United States. According to their research, "...paleoclimatic data suggest that droughts as severe as the 1950's drought have occurred in central North America several times a century over the past 300-400 years, and thus we should expect (and plan for) similar droughts in the future. The paleoclimatic record also indicates that droughts of a much greater duration than any in the 20th century have occurred in parts of North America as recently as 500 years ago." Based on this research, 1950's drought situation could be expected approximately once every 50 years or a 20% chance every ten years. An extreme drought, worse than the 1930's "Dust Bowl" has an approximate probability of occurring once every 500 years or a 2% chance of occurring each decade. The degree of risk can not be determined beyond the county scale and, therefore, the County is assumed to have the same risk Countywide.

Blight & Drought Vulnerability

Blight and drought are hazards that do not normally cause structural damage but can have significant population and economic effects. If significant enough, a drought could affect the drinking water supply for the public water system and private wells. With a large population of the County relying on the public water supply, drought conditions could have a large impact on that system, if affected. A drought or blight could also have significant impacts on the agricultural community. With over \$3,000,000 in livestock and poultry sales based on data from the Montana Agricultural Statistics Service Census of Agriculture in 2001, economic losses could result from loss of pasture and food supply for those animals. These losses would be in addition to those losses associated with lower crop yields due to drought conditions. Crop farming only makes up a small percentage of the economy in Silver Bow County.

Another major impact of drought is to the natural resources of the area. As river and stream levels drop, fish populations and other natural resources are impacted. A hazard directly related to drought is wildfire. Drought conditions increase the chances of a major wildfire to threaten the community. Unlike many other events, drought evolves slowly, and therefore, the direct impact to the population (i.e. loss of life, injuries) would be low.

COMMUNICABLE DISEASE & BIOTERRORISM

Human diseases, particularly epidemics, are possible throughout the nation and Silver Bow County is not immune to this hazard. In addition, livestock and animal disease could have a devastating effect on the economy and food supply in Silver Bow County and beyond. Highly contagious diseases are the most threatening to both populations.

Naturally occurring diseases, some of which may not have even formed yet, could infect the population with little notice. Others, such as West Nile Virus, could become a greater problem in Silver Bow County and require emergency actions at some point. Diseases that have been eliminated from the United States population, such as smallpox, could be used in bioterrorism. The following list gives examples of biological agents or diseases that could occur naturally or be used by terrorists as identified by the Butte-Silver Bow Health Department:

- Botulism
- Food borne outbreaks such as Salmonella
- Inhaled Anthrax
- Nerve Gas illness
- Pandemic Influenza
- Pneumonic Plague
- Radiation sickness
- SARS – Severe Acute Respiratory Syndrome
- Smallpox
- Tularemia (inhaled)

Historically, the Spanish influenza outbreak after World War I in 1918-1919 caused 9.9 deaths per 1,000 people in the State of Montana according to a report titled *The Economic Effects of the 1918 Influenza Epidemic* by Elizabeth Brainerd and Mark V. Siegler in June of 2002. Historical records from newspapers show that the influenza outbreak was so bad in 1918 that residents were quarantined from November 30 to December 17 after 18 people died and 53 new cases were discovered. In 1979 and again in late 2003, a flu epidemic hit Silver Bow County infecting hundreds of people.

Another quarantine was in place from September 15, 1934 to November 1, 1934 for children under the age of eighteen after seven cases of poliomyelitis (infant paralysis) were discovered. Similar disease events could potentially occur in the future depending on the medical services available and treatment effectiveness.

Known livestock and animal diseases such as Foot and Mouth, Bovine Spongiform Encephalopathy (BSE or Mad Cow Disease), Exotic Newcastle, Rabies, Scabies, and Brucellosis could have damaging effects on the livestock population according to the Montana Department of Livestock. Based on the Montana Agricultural Statistics Service Census of Agriculture data from 1997, Silver Bow County had 116 farms. Ninety-three percent of the market sales from those farms were livestock sales. Losses from those animals would be devastating and could have an economic effect Countywide.

Silver Bow County, given the uncertain nature of diseases, is assumed to have the same risk Countywide and is a threat to people, livestock, and wildlife.

Communicable Disease & Bioterrorism Vulnerability

Diseases threaten the population, plants, and animals of Silver Bow County as opposed to structures. The entire population of 33,604 is at risk for contracting disease. The urban nature of the Butte and Walkerville makes them more vulnerable to rapidly spreading and highly contagious diseases than other more rural parts of Silver Bow County and Montana. Another contributing factor is that Silver Bow County has a higher percentage of persons over 65 years old than most other communities in Montana. Over 5,000 residents in Silver Bow County are over the age of 65. The number of fatalities in the County would depend on the mortality rate and the percentage of the population affected. The ability to control the spread of disease will be dependent on the contagiousness of the disease and movement of the population.

As a whole, Silver Bow County is at a very low risk of bioterrorism in comparison to other parts of the country, however, the possibility of a bioterrorism event occurring in Silver Bow County or originating elsewhere and moving into Silver Bow County cannot be ruled out. Agricultural and animal bioterrorism is also possible. Although farming makes up an important part of the regional economy, the sales are relatively small compared to other parts of the State and terrorists would not make a large statement, as they often try to do, in targeting Silver Bow County.

DAM FAILURE

For varying reasons from irrigation to power generation, dams have been placed throughout Southwest Montana. These dams could now present a problem to those downstream, if they were to fail. The National Inventory of Dams (NID) website keeps a record of dams across the country. Hazard ratings are also given to those dams for emergency management planning purposes. These ratings, high, significant, and low, are based on the potential for loss of life and property damage from the failure of the dam, not the condition or probability of the dam failing. Definitions, as accepted by the Interagency Committee on Dam Safety and posted on the NID website, are as follows:

Low Hazard Potential

Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Significant Hazard Potential

Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

High Hazard Potential

Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

Locations of the dams that could affect Silver Bow County are shown on the map titled Dam Locations in Appendix A. Silver Bow County has three high hazard dams, one significant hazard dam, and five low hazard dams within the County as shown in Table 5-20.

Table 5-20

Dams in Silver Bow County, Montana							
Dam Name	River	NID Height (feet)	NID Storage (acre-ft)	Drainage Area (sq. mi)	Year Finished	Hazard	Owner
Basin Creek Dam #1 (Debbi's Dam)	Basin Creek	101	1,170	12.4	1897	High	Butte-Silver Bow
White Silver	White Pine Creek	15	67		1950	Low	Hazel Spangler
Stauffer Chemical #1	Silver Bow Creek Tributary	47	815		1954	Low	Rhone Poulenc
South Fork Reservoir	Divide Creek	20	51		1946	Significant	Butte-Silver Bow
Moulton Reservoir #2	Yankee Doodle Creek	25	50		1950	Low	E.H. Sparks

Table 5-20 (continued)

Dams in Silver Bow County, Montana							
Dam Name	River	NID Height (feet)	NID Storage (acre-ft)	Drainage Area (sq. mi)	Year Finished	Hazard	Owner
Grove Gulch	Grove Gulch Creek	30	88		1964	Low	Don Marshall
Basin Creek Dam #2	Basin Creek	49	290	4.72	1907	High	Butte-Silver Bow
Moulton Creek Dam #1	Yankee Doodle Creek	67	860	2.64	1907	Low	Butte-Silver Bow
Yankee Doodle Tailings Dam	Yankee Doodle & Silver Bow Creeks	625	7,200		1972	High	Montana Resources

In addition to these dams, Butte-Silver Bow owns other dams in neighboring Deer Lodge County. They are listed in Table 5-21.

Table 5-21

Dams outside Silver Bow County, Montana							
Dam Name	River	NID Height (feet)	NID Storage (acre-ft)	Drainage Area (sq. mi)	Year Finished	Hazard	Owner
Silver Lake East Dam	Storm Lake Creek Tributary	11	17,920	1.90	1918	Low	Butte-Silver Bow
Silver Lake West Dam	Georgetown Lake Tributary	17	17,920	1.90	1918	High	Butte-Silver Bow
Storm Lake Dam	Storm Lake Creek	29	2,150	1.90	1898	High	Butte-Silver Bow

As the dams continue to age, they present a greater hazard without mitigation or dam repairs.

On June 4, 1908, White's Reservoir dam broke flooding Butte and leaving the City without phones, telegraphs, electricity, street cars, or railroad service. The rivers were quite swollen from this event, however, levels returned to normal by June 13th. Then on July 11, 1916, Superior Dam, north of Meaderville, broke and the tailings flooded the north end of East Butte causing \$8,000 in estimated damages.

A seismic evaluation was done on the Yankee Doodle Tailings Dam at the confluence of the Yankee Doodle and Silver Bow Creeks for its owner, Montana Resources, in April 1993. The dam is located northeast of Butte and functions as a waste rock repository and impoundment for tailings from mining operations. This evaluation found the dam to be seismically safe when modeled under maximum credible earthquake conditions. This evaluation was done by Harding Lawson Associates and can be found in the Butte-Silver Bow Disaster and Emergency Services Office.

Dam Failure Vulnerability

The dams that could have the greatest impact to life and property demonstrated by their NID hazard rating are the high hazard Basin Creek Dams #1 and #2 and the Yankee Doodle Tailings Dam, followed by the significant hazard South Fork Reservoir Dam. Those areas directly downstream from these high and significant hazard dams would be the areas most at risk for loss of life and structural damage.

The Butte-Silver Bow Public Works office has emergency action plans for the Basin Creek Dams, Moulton Creek Dam #1, Silver Lake West Dam, and Storm Lake Dam. The dam failure inundation areas for Silver Lake West Dam and Storm Lake Dam, although owned by Butte-Silver Bow, would not affect Silver Bow County but rather neighboring Deer Lodge County and beyond. The Moulton Creek Dam #1, a low hazard dam, only shows the potential for affecting one structure on its inundation map. The Basin Creek Dams, though, have inundation areas that extend into the populated areas of Silver Bow County. An analysis of the inundation maps shows the flooding would extend along parts of Basin, Blacktail, and Silver Bow Creeks. Approximately, 400 structures could be affected in areas north, south, and east of the airport, the southern part of the Butte urban corridor known as the Floral Park area, and south of Rocker, Nissler, and Ramsay. The critical facilities in or near the inundation area include Bert Mooney Airport, US Forest Service Office, Montana DOT, Montana Highway Patrol, Dewey Blvd. Post Office, Social Security Offices, and the Metro Sewer Treatment Facility.

To estimate the losses from a dam break, the average damage to the structures and critical facilities impacted was estimated to be 30% since many structures may have little damage while other may be a complete loss.

For a break at the Basin Creek Dams:

- 400 structures estimated in the flood inundation area x \$74,900 median home value obtained from census data = \$29,960,000 total estimated structure value
- In most cases, many of the structures would only have moderate, minor, or no damage, so an estimate of 30% is used as the damage factor
- \$29,960,000 total estimated structure value x 30% damage factor = \$8,988,000 estimated structure loss

Specifically for the critical facilities listed, losses to the Metro Sewer Treatment Facility could be estimated at \$5,058,240. Again, these figures are purely estimates based on inundation mapping, estimated structure values, and estimated damage parameters. The losses from an actual event may vary greatly.

A dam failure event may allow for some advanced warning to the public, and therefore, the potential impact to the population is considered moderate.

EARTHQUAKE

History and seismic evaluations have shown that Silver Bow County is quite vulnerable to earthquakes. The County is located within the northern Intermountain Seismic Belt of the Rocky Mountains. Faults exist within County borders and also throughout the surrounding region. Table 5-22 lists potentially active faults within Silver Bow County as published in Montana Bureau of Mines and Geology Special Publication 114 *Quaternary Faults and Seismicity in Western Montana* (Stickney, Haller, and Machette, 2000).

Table 5-22

Faults within Silver Bow County			
Fault Name	Most Recent Earthquake	Slip Rate	Length
Rocker Fault	<1.6 Ma	<0.2 mm/yr	26.9 miles (43.4 km)
Continental Fault	<1.6 Ma	<0.2 mm/yr	11.3 miles (18.2 km)

The Rocker Fault lies to the east of, and approximately parallel to I-15, extending 27 miles (43 km) from north of Rocker to southeast of Divide. The Continental Fault extends for 11 miles (18 km) along the eastern side of Summit Valley, the valley in which Butte is built. Both I-15 and I-90 cross the Continental Fault a few miles west of the Continental Divide. The Continental Fault is exposed in the East Continental open-pit copper mine and also underlies the east abutment the Yankee Doodle tailings dam. Detailed studies of the geologically recent faulting history of the Continental Fault have yet to be conducted. A seismic evaluation was done on the Yankee Doodle Tailings Dam in April 1993, however, and the dam was found to be seismically safe when modeled under maximum credible earthquake conditions. This evaluation was done by Harding Lawson Associates and can be found in the Butte-Silver Bow Disaster and Emergency Services Office.

The age of the last surface-rupturing earthquake is not known for either the Rocker or Continental fault. Neither fault has recognized fault scarps or other geologic indicators of very young surface offset (the past 10,000-20,000 years). Both faults are responsible for the structural development of prominent valleys and therefore represent important tectonic features in the region that formed by repeated major earthquakes through geologic time. The fault within Silver Bow County that is the most active, according to the Yankee Doodle Tailings Dam Seismic Evaluation, is the Continental Fault. Through this evaluation and a master's thesis done by A.V. Corry in 1931, the maximum credible earthquake for this fault is believed to be a magnitude 6.5. Although neither fault has documented evidence of recent offset, both are classified as having Quaternary offset (movement during the past 1.6 million years), and common sense would dictate that these faults be considered as potentially capable of producing future earthquakes.

History has shown that significant earthquakes (up to magnitude 6.5) may occur anywhere throughout the Intermountain Seismic Belt, even in areas where young faults are not recognized. Examples of damaging earthquakes for which no known surface fault was recognized includes the 1925 Clarkston earthquake (magnitude 6.6) and the 1935 Helena earthquakes (magnitude 6.3-5.9). The greatest activity on the Intermountain Seismic Belt passes to the east of Silver Bow County and it is most likely that future earthquakes that affect this County will be centered at some distance away within the most seismically active region.

The US Geological Survey's National Seismic Hazard Mapping Project has created peak ground acceleration maps. The maps, including the one for Silver Bow County titled Earthquake Zones in Appendix A, show the strength of seismic shaking that has a 10% probability of being exceeded in a 50 year period. The strength of the shaking is measured as a percent of the acceleration of gravity (%g). All of Silver Bow County, with the exception of the extreme southeast corner, is located in an area that has a 10% probability of exceeding a peak ground acceleration of 7.5-15%g in a 50 year period. The extreme southeast corner has a 10% probability of exceeding a peak ground acceleration of 15-20%g in a 50-year period. Therefore, the risk of strong shaking from earthquakes, although slight, increases to the south and to the east in Silver Bow County.

Since 1900, Silver Bow County and the surrounding area have experienced 15 earthquakes of magnitude 5.5 or greater. This history has been compiled based on data from the Montana Bureau of Mines and Geology and the University of Utah Seismograph Stations and is shown in Table 5-23.

Table 5-23

Earthquakes Magnitude 5.5 or greater near Silver Bow County, Montana		
Date	Approximate Location	Magnitude
6/28/25	Clarkston	6.6
2/16/29	Lombard	5.6
10/12/35	Helena	5.9
10/19/35	Helena	6.3
10/31/35	Helena	6.0
11/23/47	Virginia City	6.1
8/18/59	Hebgen Lake	7.5
8/18/59	Hebgen Lake	6.5
8/18/59	Hebgen Lake	6.0
8/18/59	Hebgen Lake	5.6
8/18/59	Hebgen Lake	6.3
8/19/59	Hebgen Lake	6.0
10/21/64	Hebgen Lake	5.6
6/30/75	Yellowstone Park	5.9
12/8/76	Yellowstone Park	5.5

Specific to the Silver Bow County area, strong earthquakes have occurred near Butte as identified from the State Hazard/Vulnerability Analysis prepared in 1987. On September 6, 1895, an earthquake estimated as 5.0 in magnitude on the Richter scale hit the Butte area. This earthquake is estimated to have been felt for about 12,000 square miles (or about 30,000 square kilometers) surrounding the epicenter. Then on April 19, 1910, a magnitude 5.4 earthquake struck near Butte again. This earthquake was estimated to have been felt for about 27,000 square miles (or about 70,000 square kilometers). The 7.5 magnitude Hebgen Lake earthquake in 1959 caused \$75,000 - \$100,000 in damages to the Franklin School according to historical newspaper records. A smaller 5.25 magnitude earthquake 90 miles southeast of Butte on January 5, 1965 knocked over dishes and Christmas trees, but did not result in any injuries or substantial damages. More recently, though, the October 28, 1983 Borah Peak Idaho earthquake, magnitude 7.3, and the June 7, 1994 5.0 magnitude earthquake centered near Challis, ID were felt in Silver Bow County.

Earthquake Vulnerability

Earthquake damages can be hard to predict and assess without detailed structure information or a damage model. Luckily, the Federal Emergency Management Agency has developed loss estimate software for earthquakes (HAZUS 99). A newer version for multiple hazards, HAZUS-MH, is currently being developed. The results from a run through the model follows.

HAZUS 99 – Continental Fault at 6.0 magnitude

A scenario based on a magnitude 6.0 surface-rupturing earthquake centered over the Continental Fault was run using the default data in the Federal Emergency Management Agency's (FEMA) Loss Estimation Software for Earthquakes - HAZUS 99, Service Release 2. This analysis could potentially have large errors because of the inaccuracies involved with using the default data, particularly using the default soils data. This "first cut" estimate, though, provides some preliminary figures to use in planning before a more detailed analysis can be done.

HAZUS 99 estimates that the following number of buildings would have each level of damage:

Slight – 4,315 structures

Moderate – 3,508 structures

Extensive – 1,121 structures

Complete – 210 structures

Those damages to 9,154 buildings would equate to just over \$313 million, including contents and income losses, based on the HAZUS 99 estimates.

In terms of public infrastructure and essential facilities that are included in HAZUS 99 default data, the roadways would not be damaged, however, 30 bridges within the County would be less than 50% functional with repairs totaling over \$5 million. An average building type was used for the hospitals, fire stations, communications facilities, and schools. The fire stations ranged from 12% to 73% functional after this event. The schools were anywhere from 11% to 73% functional, but averaged 22% functionality. Communications facilities, such as radio and TV stations, would be about 20% functional at Day 0 and 70% functional at Day 1. The St. James Hospital was assumed to have 103 beds and its functionality after the event is broken down in Table 5-24:

Table 5-24

HAZUS Estimated St. James Healthcare Hospital Functionality after 6.0 Earthquake		
Date	St. James Functionality	St. James Beds
Day 0	27%	28
Day 1	28%	29
Day 3	34%	35
Day 7	43%	44
Day 30	72%	74

The casualties from this event would depend on the time of day the earthquake occurred and would be broken down as follows:

2AM – 115 casualties

2PM – 298 casualties

5PM – 129 casualties

The results from HAZUS 99 could potentially be more accurate and informative if better data was developed and used in the analysis. Such an analysis may be considered by the County in the future and run with the new HAZUS-MH program.

Many structures, including critical facilities, within Silver Bow County have not been seismically assessed. As the 2000 census data indicates, over 85% of residences were constructed prior to 1980 and over 40% of residences were constructed prior to 1940. Many of the existing homes, businesses, and critical facilities may not be structured to withstand seismic shaking.

Most of the County has comparable seismic risk based on the peak ground acceleration probabilities. Based on this, all of the critical facilities and vulnerable populations are considered to have the same probability for seismic shaking. A detailed study of each of the critical facilities would need to be conducted to determine the specific vulnerability to that structure and the likelihood and magnitude of damages. As demonstrated by the HAZUS run, significant structural damages to several facilities could be expected.

The population would have little and mostly likely no warning prior to an earthquake, so the impact to that population could be considered high with little time to take protective actions. The HAZUS run demonstrates the possibility for a high number of casualties.

EXTENDED COLD & WINTER STORMS

Snow storms and bitterly cold temperatures are common occurrences in Silver Bow County and generally do not cause any problems as residents are used to winter weather and are prepared for it. Sometimes, however, blizzards can occur and overwhelm the ability to keep roads passable. Heavy snow and ice events also have the potential to bring down power lines and trees. Extreme wind chill temperatures may harm residents if unprotected outdoors or if heating mechanisms are disrupted. Based on data from the Western Regional Climate Center from the official weather records for Butte since 1894, temperatures have reached -52 degrees Fahrenheit, storms have produced over 12 inches of snow in 24 hours, and snow depths have gotten up to 27 inches.

Information from the previous Hazard Vulnerability Analysis done by Butte-Silver Bow shows historical occurrences of extreme cold temperatures. Some of these temperatures may be “unofficial” yet still valid for the Butte area. The dates and temperatures are shown in Table 5-25.

Table 5-25

Historical Cold Temperatures in Silver Bow County, Montana	
Date	Low Temperature (deg F)
2/9/1933	-52
2/8/1936	-51
2/15/1936	-60
1/7/1937	-48
12/23/1983	-52

Silver Bow County also has a history of long duration cold spells. In 1983, the temperatures remained below zero from December 19 until December 25, with the 23rd recording a temperature of -52, as shown above.

The Butte – Anaconda Almanac that summarizes the major events in Butte’s history notes October 11, 1911 as a day when the Butte area received eighteen inches of snow and lost telephone and telegraph services. Western Montana was estimated to have sustained \$150,000 in damages. The Almanac also notes May 29, 1927 as the “heaviest snowstorm in 19 years.” During this event, according to the Almanac, Butte received 22 inches of snow and Flint Creek Hill received 38 inches. The area experienced problems with electrical and telephone service from this storm.

The Hazard Vulnerability Analysis completed in 1984 also recognizes May 18, 1938 and the 1980 season as particularly severe snowfall time periods. More recently, a late season snow storm dropped a foot of snow over the Butte area on June 3, 2001. Numerous power outages occurred due to the heavy snow load on foliage covered branches.

Snow generally does not cause the communities to shut down or disrupt activities. Occasionally, though, extreme winter weather conditions can cause problems. The most common incident in these conditions are motor vehicle accidents due to poor road conditions. Such incidents normally involve passenger vehicles, however, an incident involving a commercial vehicle transporting hazardous materials or a vulnerable population such as a school bus is also possible.

Extended Cold & Winter Storms Vulnerability

Since winter storms and cold spells typically do not cause major structural damage, the greatest threat to the population is the potential for utility failure during a cold spell. Although cold temperatures and snow are normal for Silver Bow County, extremes can exist that would go beyond the capabilities of the community to handle. Should the temperatures drop below -15 for over 30 days or several feet of snow fall in a short period of time, the magnitude of frozen water pipes and sewer lines or impassable streets could result in disastrous conditions for many people. If power lines were to fail due to snow/ice load, winds, or any other complicating factor, the situation would be compounded. In the event power or other utilities were disrupted, many homes could be without heat. With temperatures frequently dropping below zero in a typical winter, an event where heating systems failed could send many residents to shelters for protection. Other residents may try to heat their homes through alternative measures and increase the chance for structure fires or carbon monoxide poisoning.

Sheltering of community members would present significant logistical problems when maintained over a period of more than a day. Transportation, communication, energy (electric, natural gas, and vehicle fuels), shelter supplies, medical care, food availability and preparation, and sanitation issues all become exceedingly difficult to manage in extreme weather conditions. Local government resources could be quickly overwhelmed. Mutual aid and state aid might be hard to receive due to the regional impact of this kind of event.

The 1984 Hazard Vulnerability Analysis rates the vulnerability in terms of history as high, casualties and property damage as low, the maximum threat as medium, and the probability of occurrence in a five year period as high. For all of these reasons, although the threat to structures is relatively low, the threat to the population can be considered moderate.

FLOODING

With mountainous terrain, rivers, and creeks within and along Silver Bow County's boundaries, flooding has occurred in the past and the potential exists for flooding in the future. Riverine, flash, and ice jam flooding are all possible. Within some developed areas, localized storm water management flooding can also be a problem. The Federal Emergency Management Agency has identified a flood hazard in Silver Bow County through its National Flood Insurance Program. A Flood Insurance Study was produced for Butte-Silver Bow in March 1979 and was revised on February 1982. This study, however, did not include the Town of Walkerville. This community has not been mapped by FEMA, however, the County Disaster and Emergency Services Coordinator also notes that Walkerville does not have a riverine flood problem. A map of the available GIS data (FEMA's Q3) of 100-year floodplain within Silver Bow County is shown on the map titled Flooding in Appendix A. The associated Flood Insurance Rate Maps were established in February 1992 with a couple of Letter of Map Revisions (LOMR) since then.

The Flood Insurance Study dated March 1979 provides an overview of the flooding problem areas. Listed in this study are the Silver Bow Creek area near Rocker, the low lying areas of Sand Creek, and Grove Gulch Creek near the landfill. Not listed in the 1979 problem area descriptions, however, is the Big Hole River for its entire stretch through Silver Bow County, another area prone to flooding. Based on official historical data from the Western Regional Climate Center for the Butte Weather Station, the area has received up to three inches of rain in 24 hours.

Some significant historical events include the Big Hole Flood on June 14, 1927, the Butte Flood on July 30, 1931, and another Butte Flood on March 28, 1943. The 1927 flood of the Big Hole River is documented within the Big Hole River Floodplain Management Study, prepared in 1986 by the United States Department of Agriculture - Soil Conservation Service in cooperation with the Butte-Silver Bow County, Mile High Conservation District and the Montana Department of Natural Resources and Conservation. This study can be found in the Butte-Silver Bow Floodplain Manager's office. The March 28, 1943 flood occurred when snowmelt caused flooding to wash out several railroad and street bridges. Damages were estimated at the time as \$12,000 - \$14,000.

Heavy rainfall caused a flash flood in Butte and the surrounding areas on June 21, 1967. Western Iron Works, the Bishop building, and the Capri Motel were all flooded. Damages to City property were estimated at \$50,000, and the Capri Motel suffered an estimated \$100,000 in damages alone. Reports also indicate that part of Dublin Gulch was washed out.

More recently, a flood watch issued on June 7, 1991 for the Big Hole River resulted in the evacuation of low-lying areas near the communities of Wise River, Divide, and Melrose. A month later on July 23, 1991, a flash flood near Silver Bow Creek held up rail service near Gregson because of track stability fears. Another heavy rain event on June 28, 1992 caused in damages near Harding Way (Montana Highway 2) and resulted in the repair of culverts and roads in the German Gulch area. Then on March 6, 1993, reports were received of flooding over Highway 440 after heavy snowmelt.

In 1996, Sand Creek, within Butte's urban area, flooded the second week in February causing damage to numerous properties. After this flood event, Butte-Silver Bow applied for and received a FEMA Hazard Mitigation Grant Program grant to install larger culverts at several public road intersections along the Sand Creek drainage.

On July 29, 1996, 8 miles south of Butte, Little Basin Creek ran over its banks due to heavy thunderstorm rainfall. Runoff from this thunderstorm caused some County roads near the creek to wash out according to National Weather Service reports.

Then on July 30, 1998, torrents of rain and hail fell on Butte in an hour-long thunderstorm which dumped over 2 inches of rain and hail depths of up to four inches over most of urban Butte. Blacktail Creek was over its banks in many areas. Silver Bow Creek was also at flood stage for its length through Butte's highly populated urban area. The major Butte thoroughfares of Montana Street and Harrison Avenue were also flooded and impassable during the peak of the storm. Debris from Uptown Butte washed down large rocks and boulders, creating a hazard on many of the public streets. In some areas, underground power lines were washed out leaving residents without power for two to three days. Telephone service was also out in many areas for a period of hours to four days. Many private homes suffered flooded basements, yards, and garages. Two trailer parks, located along Grove Gulch Creek, suffered major damage. The Centerville Volunteer Fire Department also sustained major water damage. Local EPA officials called the storm a 25-year event because the storm water drainage channels designed for ten-year events were easily over flowing.

On June 4, 1999, Garfield Avenue in Butte was under five feet of water due to inadequate storm drainage. Also affected were Stuart Avenue, Pine Street, and Silver Bow Boulevard.

None of the events described here resulted in a Presidential Disaster Declaration. Silver Bow County has had one Presidential Disaster Declaration from flooding in May of 1981. Losses to the Butte area totaled over \$76,000. This event was much more widespread across the State, thus resulting in increased damages on the statewide level to elevate the event to the Presidential level.

Flooding Vulnerability

The history of flooding in Butte and Silver Bow County shows that a significant hazard is present not only from riverine and flash flooding, but urban flooding. As of December 31, 2002, Silver Bow County only had 24 flood insurance policies for a total of \$2,707,700 insurance coverage. According to the State Floodplain Manager, Silver Bow County does not have any repetitive loss flood insurance properties.

Overlaying the local structure data for the urban Butte area with the FEMA Q3 digital floodplain data as shown in the map titled Flooding in Appendix A, 295 structures are estimated to be in the floodplain. This estimation may be off due to the inaccuracies involved with the Q3 floodplain data and the structure data. FEMA's Q3 digital floodplain data is not exact and is based on mapping derived from the paper maps to provide a general floodplain area. In addition, some of the structures mapped may be recreational type facilities or may not be mapped in their exact locations relative to the floodplain. The estimate of 295 structures in the floodplain, however, will be used for loss estimation purposes. This estimate is also only of the structures within the floodplain for the urban corridor of Butte. Structure data and digital floodplain data is lacking for the rest of the County. Approximately 88% of the population is located in the urban area of Silver Bow County, so an additional 12% will be added to the number of structures in the floodplain to accommodate for the areas not covered by digital floodplain or structure data. Again, this methodology is purely for loss estimation purposes and may be inaccurate.

With a total of approximately 330 structures in the 100-year hazard area, damages could be estimated at \$7,415,100 (330 structures x \$74,900/average structure x 30% damage factor). Based on this analysis, none of the critical facilities are in the floodplain.

The vulnerabilities to flash flooding are harder to quantify without specific hazard data. In Montana, however, flash flooding has been known to be most problematic to public infrastructure such as roads. As history has shown, stormwater from Uptown Butte has caused urban flooding problems. Specific facilities have not been identified as susceptible to flash flooding.

The population impacts are considered moderate because some advanced warning of flooding is possible, particularly with riverine flooding. The impacts could be greater, however, with flash flooding, especially in any wildfire burn areas. Flash flooding many times occurs without warning and catches people by surprise.

HAZARDOUS MATERIALS & WATER POLLUTION

Silver Bow County is exposed to hazardous materials in many areas. An accidental or intentional release of materials could produce a health hazard to those in the immediate area, downwind, and/or downstream.

The major transportation routes that run through Silver Bow County are Interstate 90 East and West and Interstate 15 North and South. Both highways have the potential for a serious accident involving hazardous materials. If such an accident occurred near populated areas or water supplies, serious human impacts could result.

Another major concern related to hazardous materials is water pollution. Water pollution is viewed as a large concern because of the vulnerability of Butte-Silver Bow's water supply. Over 680 million gallons of water are stored in six reservoirs that are used for public water. The primary water supply for Butte-Silver Bow comes from the Big Hole River, Basin Creek, and the Moulton Reservoirs with the back-up supply coming from Silver Lake, an area owned by Butte-Silver Bow within Deer Lodge County. These areas not protected from spills or intentional contamination. In addition, if the Metro Sewer Treatment Plant becomes inoperable, the untreated sewage would enter Silver Bow Creek and present an additional contamination hazard. A map of the watersheds in Silver Bow County can be found on the map titled Hazardous Materials and Water Pollution in Appendix A.

Historically, incidents have been small enough to prevent a large evacuation, however, hazardous materials incidents occur on a regular basis in Silver Bow County. A few of the more significant examples include:

- January 12, 1989 – While demolishing a building on South Utah in Butte, 200 gallons of ammonia was spilled from an old tank.
- August 15, 1989 – A boil order was in effect for Butte residents due to inadequate chlorine levels. These levels were blamed on the drought and an old water treatment system.
- August 2, 1993 – A minimal amount of chlorine gas was leaked from the Stodden Park Pool in Butte.
- November 13, 1993 – A train derailed at Maiden Rock near Melrose tipping four cars, including one carrying propane. Fortunately, none of the cars leaked anything hazardous.
- February 25, 1994 – Another train derailed at Maiden Rock near Melrose, this time leaking crude oil.
- April 21, 1994 – An ammonia spill occurred at Buttrey's Warehouse resulting in an evacuation of the immediate area.
- January 23, 1995 – An anhydrous ammonia tank leaked at the MT Tech Bureau of Mines and led to an evacuation of the building.
- October 18, 1997 – Sulfuric/nitric acid was found leaking out of truck at the Flying J truck stop near Rocker.
- March 3, 1998 – A methamphetamine lab was discovered at the War Bonnet Inn in Butte. The nearby rooms were evacuated, and a law enforcement officer received medical treatment.
- March 26, 1998 – At a construction site in Butte, a bucket of epoxy resin sealer was accidentally mixed with drips of industrial paint enamel. The chemical reaction caused the mixture to bubble and emit fumes. A worker then dumped the mixture into a nearby dumpster. The surrounding one block area was evacuated, and one person complained of respiratory problems.

- June 12, 2000 – At Nissler Junction, the I-15/I-90 interchange, dynoRU Gold, a blasting agent, was accidentally spilled from a tanker truck.
- June 2001 – Health concerns were raised over mining tailings blowing from the Yankee Doodle Tailings Pond. The tailings are known to have substances that can be hazardous to humans such as arsenic, lead, zinc, and cadmium.

Since many hazardous materials incidents occur on the interstates each year, transportation data was collected in November 1996 on I-90 and I-15. On average during that time period, 56.4 commercial vehicles per hour utilized I-90 and 19.4 per hour used I-15. Of those commercial vehicles, 6.8 per hour had hazardous materials placards on I-90 and 1.6 per hour had them on I-15. The complete study can be found in the Butte-Silver Bow Disaster and Emergency Services Office.

Areas of particular concern to the Disaster and Emergency Services Coordinator are the propane tanks located near the Butte intersection of Dewey and Rowe and the hazardous materials transportation at the intersection of I-90 and I-15 due to the heavily populated areas nearby, including schools and elderly housing.

The Big Hole River Sub-Area Contingency Plan dated May 2000 identifies fixed and transportation sources containing reportable quantities of extremely hazardous materials based on Tier II forms submitted to the LEPC. The Montana Resources Concentrator was also added to this list by the LEPC. Unfortunately, other facilities may exist that have not reported to the LEPC, and therefore, are not included. Each of the facilities and chemicals were analyzed using Computer-Aided Management of Emergency Operations (CAMEO) and Areal Locations of Hazardous Atmospheres (ALOHA) for worst-case release and credible-case release scenarios for the Big Hole River Sub-Area Contingency Plan. The facilities and results for Silver Bow County can be found in Table 5-26.

Table 5-26

Known and Potential Facilities Housing Extremely Hazardous Substances				
Facility Name	Location	Material	Vulnerable Zone Radius (miles)	
			Worst Case	Credible Case
AsiMi	119140 Rick Jones Way, Silver Bow	Ammonia, anhydrous plus other chemicals	>10	0.5
Basin Creek Reservoir	10 miles South of Butte, end of Basin Creek Road	Chlorine	>10	1.1
Big Hole Water Treatment Facility	847 Divide Creek Road	Chlorine	>10	1.1
Northwestern Energy	5151 Harrison Avenue, Butte	Sulfuric Acid	<0.1	<0.1
Qwest	200 West Broadway, Butte	Sulfuric Acid	<0.1	<0.1
Qwest	1301 Dakota Street, Butte	Sulfuric Acid	<0.1	<0.1
Qwest	3715 South Harrison, Butte	Sulfuric Acid	<0.1	<0.1
Western Wireless Corporation	Butte	Sulfuric Acid	<0.1	<0.1

Table 5-26 (continued)

Known and Potential Facilities Housing Extremely Hazardous Substances				
Facility Name	Location	Material	Vulnerable Zone Radius (miles)	
			Worst Case	Credible Case
Western Wireless Corporation	Butte	Sulfuric Acid	<0.1	<0.1
Montana Resources Concentrator	600 Shields, Butte	Unknown, currently reopening	Unknown	Unknown
Montana Western Railway		Acids, not otherwise specified	Unknown	Unknown
Union Pacific Rail		Ammonia, anhydrous	>10	3.1
		Hydrogen Sulfide	>10	2.7
		Phosphorus, white, dry	>10	>10
		Sodium Cyanide, solution	>10	>10
		Sulfur Trioxide, inhibited	>10	>10
		Sulfuric Acid	<0.1	<0.1
Highways	I-90, I-15, MT-2	Gasoline (modeled as Benzene)	1.0	0.5
		Butane/LPG/Propane (modeled as Propane)	<0.1	<0.1

A map showing the locations of the fixed facilities with a credible case vulnerable zone radius of at least 0.5 miles and the associated area is shown on a map titled Sites with Extremely Hazardous Substances in Appendix A.

The Big Hole River Sub-Area Contingency Plan also references the Emergency Response Notification System (ERNS) through EPA that listed chemical spills and releases greater than reportable quantities. From July 1979 through September 1998, 41 spills occurred in Silver Bow County with 14 being from oil spills.

Hazardous Materials & Water Pollution Vulnerability

As with many hazards, the degree of risk to a particular area is hard to quantify, however, buffer zones were created around the major hazardous materials facilities and transportation routes to show the areas that would most likely be affected in a hazardous materials incident. Of course, the entire County is at some risk for a hazardous material release, but the areas shown in the map titled Sites with Extremely Hazardous Substances in Appendix A are at the greatest risk given their proximity to areas where hazardous materials can typically be found. The Moulton Water Treatment Plant, shown on the map in Appendix A, does house a sodium hypochlorite solution; however, this chemical is not as

hazardous as the chlorine in other locations. Therefore, losses from this facility are not specifically quantified.

Table 5-27 shows the at-risk population and property for each location of hazardous materials storage or transportation. The population in the area is based on 2 people per structure as derived from US Census data of 16,176 housing units and a population of 33,604. Most events would not cause structural damage but could have large population impacts in a toxic, non-explosive release. Also note that an event in or near Butte would have a greater impact than one in a more rural area.

An obvious difference exists between the fixed facility hazard areas and the transportation route hazard areas. A fixed facility would affect a large percentage of its hazard area whereas the transportation routes would only affect those areas around the point source and not the entire hazard area identified. To allow for comparisons, the following percentages will be applied to the specific hazard areas to demonstrate a reasonable estimate of the total hazard area that may be impacted in a specific event:

- Fixed Facilities – 65%
- Transportation Routes – 5%

Table 5-27

Estimated Population Impact from a Hazardous Materials Incident in Silver Bow County				
Hazardous Materials Location	Estimated # of Structures in Total Hazard Area	Estimated Population in Total Hazard Area	Potential Critical Facilities Impacted (other than the actual facility itself)	Estimated Population Impact
AsiMi	50	100	None	65
Basin Creek Reservoir	50	100	None	65
Big Hole Water Treatment Facility	20	40	None	26
Highways	7,950	15,900	<ul style="list-style-type: none"> • Metro Sewer Treatment Plant • Ramsay Pump House • TIFID Pump Station • Children's Comprehensive Services of Montana • Bert Mooney Airport • Bus Terminal • Port of Montana • Post Office- Dewey Blvd • Post Office – Ramsay • US Forest Service • US Social Security Offices • Bureau of Land Mgmt • KXLT Radio Station • KTVN Television Station • AT&T Broadband • Northwestern Energy Substation 	795

An important note to Table 5-27 is that the figures are very general estimates and an actual event would be driven by many variables such as incident location, weather conditions, and the type and amount of material released.

Other hazardous materials do exist in Silver Bow County, however, only those that house the most toxic substances were considered here. In addition, any type of explosive release could result in structural damage in the explosion vicinity. Otherwise, the primary hazard is to the population and the accessibility of critical facilities in the incident area.

HEAT WAVE

Although Silver Bow County is not known for its hot weather, temperatures have reached 100 degrees. Long stretches of hot weather can affect sensitive groups. The greatest concern would be in the event of a long term power outage combined with hot temperatures. Without power, many elderly residents and other sensitive groups would be without air conditioning and could be adversely affected.

Additional impacts related to loss of power for extended periods would include availability of potable water, household sanitation issues, and fire response capabilities as the community water system becomes non-functional. Effects of the loss of power would extend to communications systems as cell phone systems fail and land-line telephone switching facilities run out of fuel for standby generators. The potential also exists for commercial fuel shortages and associated impacts to population mobility and civil unrest as gas stations ration or refuse fuel to customers. Population migration to areas not affected creates a local condition where large areas of the community are unpopulated and therefore susceptible to property crime and looting. In most cases, an economic impact will be felt as businesses close down for the duration of the emergency due to lack of power, available employees, and/or communication capabilities.

Related to heat waves are the problems of drought and wildfire. Both of these hazards, also addressed in this plan, are made worse during hot spells. Hot temperatures can also increase the risk of train derailments from the rails warping under the heat, however, the Port of Montana has not experienced problems in the past.

Heat Wave Vulnerability

The heat wave vulnerabilities are primarily to the population, particularly the elderly and sensitive groups. With a greater percentage of elderly residents in Silver Bow County compared to many other communities, the vulnerability to heat is increased. Those centers housing elderly populations would be of particular concern. As mentioned above, a power outage would probably result in greater impacts from a heat wave. At that point, public water services are threatened, and the potential for civil unrest increases.

Overall, however, heat wave is not a significant hazard to Silver Bow County. The impact to the population and structures can be considered low.

LANDSLIDE

Given the steep terrain in parts of Silver Bow County, a potential does exist for landslides. In addition, a USGS study has identified the northern part of Silver Bow County as an area of moderate landslide susceptibility. Another small area along the southwest border of Silver Bow County has been identified as a moderate incidence landslide area. A map of these areas can be found on the map titled Landslide Hazard Overview in Appendix A. This study, USGS Open-File Report 97-289 by Jonathan W. Godt, looked at incidence and susceptibility of landslides on a nationwide basis. Therefore, the areas identified are general and not exact on the county scale. The following is noted in the USGS study, "Susceptibility is not indicated where same or lower than incidence. Susceptibility to landsliding was defined as the probable degree of response of [the areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landsliding. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated."

Historically, damages have not been recorded in the County due to landslides. Much of the land within the landslide hazard area is part of the Beaverhead/Deerlodge National Forest. Again, however, this hazard area could reflect a generalization over a large area. A more specific study would need to be conducted to accurately profile this hazard.

Landslide Vulnerability

The specific vulnerabilities to landslide are difficult to determine with only very general data to base an analysis on. More site specific information could determine if a structure or area is at risk for landslides. To determine potential losses, a more detailed study of the landslide hazard would need to be undertaken. Mostly likely, a landslide would only affect a small part of the entire hazard area.

NEAR SURFACE GROUND CONTROL FAILURE & SUBSIDENCE

Silver Bow County has a strong, powerful history with the mining industry. Butte is known as “The Mining City” and pits and mines can be seen throughout the County. The success of mining in the area left behind many shallow mine workings that now present a hazard to the community. The ground control failure of these shallow mine workings could cause multiple casualties and destroy existing structures. If future development occurs in areas where there shallow mine workings exist, those structures could also potentially be threatened by these abandoned mines.

Many instances of shaft, stope, and raise caving and subsidence have occurred over the years. Some instances have occurred where heavy equipment and parts of buildings have sunk into shallow mine workings.

The map titled Mine Shaft Failure in Appendix A shows the locations of mine shafts throughout the County. This map, however, still lacks the exact locations of many mine shafts in the communities. Many mine workings have not been mapped and the exact locations of unrecorded workings are frequently not found until a failure occurs. Butte-Silver Bow knows of 4,000 mining claims in the County, but only knows where 700 of them actually are. A comprehensive map of the area mining claims is not known to exist and the stability of many of the mine workings has never been determined. In addition, those mine shafts that have been capped are still not considered safe or structurally sound. Of greater concern, however, are the last underground mines to have operated that still have head frames. Those mines are considered to be at the greatest risk for uncontrolled entry and failure between the “sheets” and solid rock.

A study of the mine shaft problems was done recently. This study - Belmont Subsidence Evaluation and Redevelopment Project for Butte-Silver Bow City-County by Portage Environmental, Gary Jones, PE, in January 2002 - can be found in the Butte-Silver Bow Planning Department. An additional study utilizing local expertise and those who coordinated subsidence remediation activities such as the design and installation of bulkheads during the 1970’s and 1980’s could supplement this study.

Currently, the Butte-Silver Bow Planning Department recommends to builders that for mine shafts 250 feet deep or deeper, buildings should not be placed within a 100 foot diameter of that location. These are just recommendations, however, and the responsibility is ultimately on the builder to investigate and determine the site’s safety.

In an average year, approximately 20 subsidence incidents are reported to the Butte-Silver Bow government each year. Approximately 20% of those incidents are not mining related. Most collapses occur in the spring, especially during wet springs, and such instances have been increasing as the mine workings get older. Traditionally, dealing with mine workings subsidence has been a response issue. Subsidence or actual collapses are very hard to predict and Butte-Silver Bow typically responds to the incidents with an emergency remedy.

Near Surface Ground Control Failure & Subsidence Vulnerability

Near surface ground control failure and subsidence vulnerabilities are both to people and property. Mine workings generally collapse with little notice and have the potential to damage nearby structures. In addition, with many unknown closed shaft locations, structures may have and could continue to be

built on unstable ground. Without any hard data on losses from previous incidents, an accurate loss estimation cannot be conducted. Currently, the threat to the population is low and moderate to property.

STRIKE & CIVIL UNREST

When large groups or organizations take action all at once, the results can be disastrous and disruptive. The potential exists in Silver Bow County for civil unrest or strikes that exceed the capabilities of the local government to handle. Butte in particular has a colored history of strikes and civil instability. Some of the notable strikes that have occurred in Silver Bow County can be found in Table 5-28. This information was gathered using the Butte-Anaconda Almanac available at the Butte-Silver Bow Public Archives.

Table 5-28

Historic Strikes in Silver Bow County, Montana			
Organization	Approximate Start Date	Approximate Duration	Notes
Mine workers	6/25/1878	63 days	
Newspaper workers	2/13/1907	44 days	
IWW	4/19/1920	Unknown	
Newspaper workers	6/20/1927	15 days	
Mine workers	5/8/1934	135 days	
FERA relief workers	12/26/1934	Unknown	
Mine workers	8/27/1951	11 days	
Railroad workers	3/5/1959	2 days	
Mine workers	8/18/1959	181 days	
Copper workers	6/15/1967	258 days	\$5.5 million lost in wages
Teachers	4/10/1970	2 days	
Mine workers	7/25/1977	109 days	
Firefighters	9/17/1978	11 days	Government offices closed
Teachers	1/6/1986	3 days	No school

Other examples of civil unrest include a jail riot that broke out on March, 18, 1912 and the April 21, 1920 Anaconda Road Massacre where 15 people were shot during the International Workers of the World (IWW) strike. This incident prompted federal troops to take action in Butte the following day. More recently in April of 1997, the nurses at St. James Hospital in Butte set a strike date. Fortunately, this strike was mitigated, however, if the strike had taken place, healthcare services in Silver Bow County would have been severely affected.

Over the past several years the union presence in Butte has diminished, however, there is still a very strong core of union employees and supporters in the communities. Any time there is a possibility of a strike or pickets, the matter is taken very seriously by all, including law enforcement.

Although major incidences have not occurred to date, the Fourth of July celebration is a particularly vulnerable time for civil unrest due to the number of large events going on. Another major event within Silver Bow County is the annual St. Patrick's Day celebration due to open alcohol consumption and a large influx of visitors, college students, and celebrations. This activity usually starts on the day prior to St. Patrick's Day and continues through the early morning hours, if not into the day following St. Patrick's Day.

Strike & Civil Unrest Vulnerability

The effects of strike and civil unrest are typically felt by the population. The greatest risk is to human lives during times of unrest. Looting, however, can be commonly found in association with these types of events. Therefore, this hazard places both the population and property at risk. Urban areas and places of public gathering are generally going to be the areas of greatest risk.

Without documented losses from past events, future losses are difficult to predict. The number of strikes, however, have been decreasing. The 1984 Hazard Vulnerability Assessment ranked the vulnerability of the community to these events as low based on the history, potential casualties and property damage, the maximum threat scenario, and probability of a future event.

STRUCTURE FIRES

Although structure fires are usually individual disasters and not community-wide ones, the potential exists for widespread structure fires that displace several businesses or families. Urban blocks, commercial structures, and apartment buildings are especially vulnerable.

A history of major structure fires in Butte-Silver Bow was compiled by the Hazard Analysis Committee of Disaster & Emergency Services in January 1984 and can be found in Table 5-29.

Table 5-29

Historic Major Fires in Silver Bow County, Montana				
Date	Location	Time	Fatalities	Damage (\$)
4/24/1888	Centennial Hotel		2 dead	56,000.00
1/15/1895	Explosion, Box 72	10:00 pm	62 dead	122,100.00
5/31/1897	Butte Reduction Works	2:10 am		
3/2/1898	Florence Hotel			
3/21/1898	Hale House	3:10 am	4 dead	90,000.00
11/10/1899	Big Blackfoot Milling Co.	11:50 pm		10,000.00
1/7/1900	Hennessy Warehouse	4:50 am		28,280.00
6/20/1900	Reed Barn			34,000.00
7/13/1901	Butte Hotel	2:30 am		10,000.00
8/30/1901	Kennedy Furniture Co.	6:15 pm		13,000.00
4/21/1903	Olsen & Christie	12:00 pm		29,900.00
4/4/1905	Adelaide Block	11:15 pm		15,800.00
4/16/1905	Western Lumber Co.	1:45 pm		17,083.00
9/24/1905	Symons Store	8:30 am		698,000.00
3/26/1906	Olsen & Christie	6:50 pm		50,300.00
10/28/1907	Columbia Gardens Pavilion			
3/2/1908	Butte Reduction			
4/22/1908	Palace Stables	10:30 pm		10,000.00
10/15/1910	Odeon Dance Hall	1:30 am		11,500.00
2/11/1911	St. Joseph Church	12:00 am		15,000.00
10/24/1911	Butte Reduction			
1/11/1912	Henningsen Produce Co.	4:00 am		21,000.00
4/10/1912	Olsen & Christie	12:18 pm		295,000.00
5/25/1912	Empress Theatre	7:25 am		24,500.00
5/25/1912	Grand Opera House			
7/30/1912	Creamery Café	4:45 pm		48,692.00
9/1/1912	Thomas Block	12:05 pm		220,935.00
10/18/1912	H & B Block	1:00 am		49,381.00
11/17/1912	Sacred Heart Church	9:30 pm		26,000.00
1/13/1913	Brownfield Canty Co.	7:15 am		22,500.00
1/17/1913	Foster Block	5:15 am		15,000.00
12/29/1913	Ivanhoe Block	2:05 am		10,000.00
2/14/1916	Penn Mine Fire		21 died	\$100,000.00
9/29/1916	A.C.M. Warehouse (N. Main St.)	7:19 pm		26,500.00

Table 5-29 (continued)

Historic Major Fires in Silver Bow County, Montana				
Date	Location	Time	Fatalities	Damage (\$)
6/8/1917	Granite Mountain/Speculator Mine Fire		168 died	\$800,000.00
3/20/1918	Wolftone Block	1:25 am	1 dead	10,250.00
3/27/1918	McKee Printing Co.	3:25 am		18,000.00
6/30/1918	Montana Mattress Co.	5:58 pm		15,500.00
5/25/1919	707 W. Granite	2:19 pm		15,000.00
8/18/1919	Ryan Fruit Co.	2:00 am		112,569.00
11/23/1919	Montana Hardware Warehouse	9:06 pm		126,200.00
12/14/1919	McKinley School	10:37 am		54,650.00
2/14/1920	Trip & Dragsted	7:00 am		69,800.00
3/15/1920	Shriner Furniture Co.	12:30 am		13,765.00
9/24/1920	Peoples Theatre	2:10 am		23,000.00
4/22/1921	Braund House	4:40 am		
12/6/1922	Russell Oil		3 dead	
4/17/1923	Miner Publishing Co.	5:55 am		25,000.00
9/4/1923	708 Front St.	8:10 pm		11,377.16
4/8/1924	Rampou Café	2:45 am		19,000.00
8/17/1924	Ryan Fruit Co.	9:09 am		11,500.00
8/24/1924	59-63 E. Park St.	2:20 am		25,547.00
5/20/1925	Foster Block	4:50 am		13,090.00
1/7/1926	Cartee Hardware Co.	11:00 pm		
2/20/1926	F.B.Price Tea Co.	2:20 am		22,000.00
3/22/1926	Patterson Candy Co.	6:55 pm		
1/18/1927	Henninson Co.	3:55 pm		18,500.00
2/14/1927	Silver Bow Block	7:42 am	1 dead	23,495.00
6/9/1927	Ryan Fruit Co.	5:57 am	1 dead	27,360.00
7/30/1927	Largey Lumber Co.	3:00 pm		20,000.00
8/14/1929	1131-1133-1145 Antimony St.	8:45 pm		21,769.00
9/14/1929	Metro Goldwyn	7:45 pm		13,200.00
4/10/1930	114 S. Main St.	9:16 pm		20,886.00
11/30/1930	Bank Hotel	11:55 pm		79,500.00
3/30/1931	Murphy Money Back Store	3:22 am		19,500.00
4/15/1931	Empress Theatre	8:11 pm		17,457.00
9/28/1931	Brody's, Park & Wyoming	6:05 pm		29,650.00
5/9/1932	Columbia Block	3:35 am		125,428.00
10/9/1932	Mayer Building	4:45 am		69,000.00
12/25/1933	Colbert Drug	8:06 am		22,102.00
12/4/1935	Hughes, 56 W. Park St.	7:26 pm		10,283.00
4/10/1937	Longfellow School	5:25 pm		50,795.00
3/27/1939	Warehouse, S. Montana St.			155,000.00
5/4/1939	315 W. Broadway	11:26 pm		12,703.00
11/11/1940	Boston Block	10:00 pm		54,161.00
3/15/1942	Copper City Fire			

Table 5-29 (continued)

Historic Major Fires in Silver Bow County, Montana				
Date	Location	Time	Fatalities	Damage (\$)
3/23/1942	Casey Candy Co.	2:15 am		17,000.00
10/19/1943	Pinzel's, 33 W. Park	4:17 am		18,343.00
12/19/1943	Safeway Warehouse	12:28 pm		54,000.00
4/2/1945	Woman's Club, Park & Clark	10:43 am		10,000.00
5/26/1945	Columbia Market	8:35 pm		16,300.00
10/21/1945	Western Iron Works	2:52 am		12,700.00
4/10/1946	Old Butte High School	9:35 pm		320,000.00
12/19/1946	Masonic Temple, Walkerville			
5/25/1948	Harrison Ave. Tire Shop	12:36 pm		140,000.00
9/23/1949	Park Theater	2:10 am		80,000.00
1/8/1950	Winter Garden Bowling Alley	6:35 am		50,500.00
2/1/1950	American Theater	3:22 am		74,000.00
10/18/1951	Vroom Block	10:00 pm	4 dead	100,000.00
1/20/1954	Butte YMCA	7:30 am		100,000.00
8/9/1954	Butte Hotel			1,000,000.00
2/2/1955	Whittier School	10:00 pm		108,000.00
11/10/1955	Phythian Castle	2:05 am		
6/10/1958	Harrison Ave. Safeway			100,000.00
3/27/1960	Butte Public Library			175,000.00
11/20/1960	Sigman Meat			500,000.00
1/24/1961	Franklin School			190,595.00
11/1/1961	10 E. Gagnon			
4/1/1962	Meaderville Merc/Brass Rail			100,000.00
8/24/1963	Dynamite Explosion/East Butte		1 dead	
1/22/1964	Wintergarden Bowling Alley			155,000.00
9/6/1964	Princeton Apts. 50 S. Main			
9/12/1964	Vroom Block			
8/5/1967	Bonner Block, 228 S. Main			
6/18/1968	House Fire at 2046 Wall		2 dead	
6/19/1969	Classic Bar			
6/24/1969	Heidelberg Bar, Al's Photo, Board of Trade			
11/8/1970	Moxom Café			
2/21/1972	J.C. Penney & Others			5,000,000.00
7/28/1973	Medical Arts Bldg. (35 stores/offices)			2,500,000.00
3/18/1974	Cooney Brokerage			200,000.00
10/14/1974	Diana Hughes/Gamers, Gene's Furs			
10/14/1974	Copper City Chevrolet			
8/20/1975	Pennsylvania Bldg.			290,000.00
8/7/1978	Diana Shops			
10/21/1978	Silver Bow Block/Intermountain Bldg.			285,670.00

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Table 5-29 (continued)

Historic Major Fires in Silver Bow County, Montana				
Date	Location	Time	Fatalities	Damage (\$)
2/20/2000	Sundown Saloon			20,000
4/10/2000	House Fire at 102 Sutter St		1 dead	
3/8/2001	Kelly's Body Shop & Wrecker Service			
3/27/2002	Ponderosa Club			30,000
6/1/2002	House Fire at 1029 Nevada		1 dead	60,000
2/18/2003	Rudolph's Furniture			750,000
4/21/2003	Montana Broom & Brush			
10/10/2003	Commercial Fire at 44 East Park			

100 Year Total for just these fires = \$16,704,616 plus 272 deaths

The Montana Standard newspaper also researched and published a section on structure fires in the Butte. This research and story was printed on December 1, 1991 and was written by Tracy Thornton. Table 5-30 lists some of the statistics The Montana Standard compiled.

Table 5-30

Silver Bow County Statistics		
Years	Total Fires	Estimated dead
1879-1889	15	7
1890-1899	27	81
1900-1909	65	7
1910-1919	71	208
1920-1929	74	17
1930-1939	37	10
1940-1949	21	2
1950-1959	33	9
1960-1969	60	9
1970-1979	45	6
1980-1989	18	2
1990-1991	10	1

Since that history was developed, other serious fires have occurred in Silver Bow County, including a fire on September 3, 1998 at the Pre-Release Center that services the community with counseling and corrections services. Damages were estimated at \$25,000. An explosion of a 5,000 gallon tank of zinc sulfate monohydrate in an industrial park on September 22, 1999 resulted in one injury. Then on September 30, 1999, a fire broke out at the County jail resulting in the transfer of several prisoners. Since 1991, a million dollar loss fire has occurred, fires were set in the County Attorneys office, State Probation Office, and Chamber of Commerce among others. Over the last 10 years, five more fatalities have been attributed to fires.

The greatest number of deaths from a structure fire in Silver Bow County occurred on January 15, 1895, also known as the Kenyon-Connell fire, killing 57 people, including 13 firefighters. These firefighters represented the majority of the department at that time. Silver Bow County also has the

distinction of having one of the largest mine fires in history on June 8, 1917 when 168 people were killed in the Granite Mountain/Speculator Mine Fire.

The mining industry of the area employed much of the population at one time. During those times, many workers would bring home dynamite and sometimes store it in their basements. Now, many years later, dynamite can still be found in basements around Butte, sometimes without the residents knowing it. The possibility of explosions during structure fires is an increased hazard for firefighters and the general population.

This history shows that structure fires are a serious concern for Silver Bow County. The losses, primarily covered by insurance, have not resulted in a Presidential Disaster Declaration, but have resulted in other negative impacts such as economic losses for the area.

Structure Fire Vulnerability

Structure fires have resulted in well over \$16 million dollars in structural losses over the past hundred years. These figures do not even include most of the minor structure fires. With these types of losses, an estimate of over \$160,000 per year can be directly related to structure fires. The large commercial structures, history of arson, and common occurrences of dynamite in local basements all contribute to the fire danger. Fortunately, the life lost from structure fires in this community have dropped dramatically.

The 1984 Hazard Vulnerability Analysis rates the vulnerability based on history as high, potential casualties and property damage as low, the maximum threat as low, and the probability as medium.

TERRORISM & VIOLENCE

Although unlikely, Silver Bow County could experience an international or domestic terrorist attack. Bombings, snipers, release of radiological materials, chemical attacks, and bioterrorism are all possible.

On December 20, 1989, two police officers and two firefighters were injured when a man detonated explosives in his car in Uptown Butte while negotiating with law enforcement. This type of violence, although rare, is still a distinct threat to the community.

Montana has traditionally attracted activist/extremist individuals and groups because of its low population and large geographic area. Groups active in Montana vary from white supremacists to single issue groups, such as environmental extremists. These groups are attracted to the state and many of them view Montana as their “home” or safe haven. Because of these views, they commit their illegal activities outside of the state. An example of this would be the Unabomber, Ted Kaczynski. Kaczynski advocated the destruction of technology and the protection of the environment. The Unabomber was responsible for sixteen bombings and three deaths around the United States.

Another example, *The World Church of the Creator*, which is a white supremacist group with a national following, advocates a “Racial Holy War” against minorities. This group has their national meeting in Superior, Montana once a year. Members of this group have been responsible for numerous homicides in the United States.

Groups such as the Phineas Priesthood of Spokane, WA used western Montana as a place to hide. The anti-government group, the Freeman, conducted an eighty-one day standoff with law enforcement in eastern Montana. At the conclusion it was determined they were a “refuge” for individuals around the country involved in criminal anti-government activity. Several of these individuals had spoken about military type action against the current government. Many other organizations besides these that have the potential to use violence exist in parts of Montana and across the country.

With very little experience and data locally on this hazard, a specific probability is hard to determine. The County as a whole is susceptible, however, critical facilities, hazardous materials locations, and City areas are at the greatest risk.

Terrorism Vulnerability

The City of Butte is the most populous part of Silver Bow County as shown on the population density map in Appendix A. This densely populated area, with close proximity to hazardous materials facilities and government buildings, could be considered the area at greatest risk for terrorism. Domestic and international terrorism can be hard to predict, and therefore, specific targets cannot be identified. As a whole, Silver Bow County is at a very low risk of terrorism in comparison to other parts of the country.

VOLCANIC ASH

Although volcanoes are not a direct hazard within Silver Bow County or the immediate area, the ash resulting from an eruption upwind could damage property within Silver Bow County. Volcanic areas do exist in the Cascade Range such as Mt. St. Helens, Mt. Rainer, and Mt. Hood to the West and the Yellowstone Caldera to the Southeast. According to a figure in the State Hazard/Vulnerability Analysis, volcanic ash has been found in the northern part of Silver Bow County, most likely from the eruptions of Glacier Peak and Mount Mazama, about 11,200 and 6,600 years ago, respectively. The uncompacted ash from Mt. St. Helens on May 18, 1980 is estimated to have been about 1 inch thick in Silver Bow County. Schools were closed for three days from May 19th to May 21st after this incident. The State's Hazard/Vulnerability Analysis estimates the return period of substantial volcanic ash fallout to generally once every 5,000-8,000 years. Active volcanoes still exist in this region of the United States, and therefore, another event cannot be ruled out.

Volcano Vulnerability

During Mt. St. Helens, the greatest costs came from the difficult task of removing volcanic ash. In Silver Bow County, the greatest threat is not necessarily to people or residences but to property such as vehicles or equipment. The volcanic dust is corrosive to metals and without proper removal can certainly cause damages to public and private property. The removal of ash from government facilities and infrastructure could potentially create costs beyond the community's capabilities. Given the low occurrences of volcanic eruptions, the probability of damage from a volcano can be considered low.

WILDFIRE

Silver Bow County's history with wildfires, the mountainous terrain, recent insect infestations, the age of the lodge pole pine, and areas of the County encompassed by the Beaverhead-Deerlodge National Forest has prompted the community to identify wildfires as a significant hazard. The map titled Wildfire, Water & Air Quality in Appendix A shows the crown fire potential in areas identified by the US Forest Service. The US Forest Service has found that the potential for damaging wildfires is most directly related to the crown fire potential. Therefore, the map shows the estimated risk for areas within the County. This mapping was primarily done for Forest Service areas, and therefore, other privately owned parts of the County may be additionally threatened and not mapped.

Damages have the greatest potential of occurring in Silver Bow County when fires meet the wildland-urban interface. Homes located within or near forested areas are at a greater risk for damage from wildfires, if proper mitigation measures are not taken. In addition, a significant loss of life could occur with residents who do not evacuate, firefighters, and others who are in the wildfire area.

Other concerns include air and water pollution from wildfires. Smoke from fires both within and outside of Silver Bow County can create poor air quality. Sensitive groups, such as the elderly and asthmatics, can be affected. Also, a large percentage of the watershed for the public water supply is also located within the Beaverhead-Deerlodge National Forest. If a fire were to occur in that area, Butte's water supply could become contaminated. Wildfires can also have a significant impact on the regional economy with the loss of timber, natural resources, recreational opportunities, and tourism.

Historically, Silver Bow County has had wildfires within the County boundaries. In August 1991, the Pigeon Creek Fire (SWNW, Sec 20, T1N, R6W) burned 120 acres. Then in October of 1991, the Chinaman's Spring Fire (NWSE, Sec 10, T3N, R9W) took 25 acres. The damages from these two fires were limited to natural resources, and fortunately, structures were not lost. More recently, during the severe Montana wildfire season of 2000, Silver Bow County only suffered two small fires in August of 2000 - the Curly Fire, 8 miles southwest of Butte, held to one-fourth of an acre and a seven acre fire east of Butte and southeast of the Whitetail Reservoir. Neighboring counties, however, were not as lucky and many large fire complexes overwhelmed their capabilities, resulting in a Statewide Presidential Disaster Declaration.

Currently, the Butte Fire Protection Association is sponsoring a Hazardous Fuels Reduction Program where homeowners that live in an interface area may receive guidance and financial assistance in creating defensible space around their homes and structures. The program features a 75/25 dollar match for out of pocket qualifying expenses for creating a defensible buffer zone to aid firefighters during interface fires. The maximum amount of money available to the homeowner is \$2,500 for projects under two acres in size and requires a homeowner match of \$833.33. If more than two acres are involved in the remediation efforts, the program will provide at total of \$5,000 with a homeowner match of \$1,666.67. This program is just now getting off the ground. Some individual and group efforts have been made a few areas of the interface. These efforts were initiated by the landowners, and in some cases, consisted of heavy logging down to individual model FIREWISE type projects.

Wildfire Vulnerability

Wildfires have the greatest potential to substantially burn national forest areas, however, private residences become threatened when the fire enters the wildland-urban interface. Several areas of

interface exist in Silver Bow County. Using the crown fire potential map in conjunction with the structure data, an estimate of the number of structures in the interface was derived. Approximately 979 structures are located in or near a moderate crown fire potential area and an additional 2,421 structures are in or near a low crown fire potential area. An important note is also that the structure data set used does not include all of the structures in the County, however, these estimates will be used for loss estimation purposes. With a 30% loss estimate on the structures in the moderate crown fire potential area in any given wildfire, a loss of \$21,998,130 can be approximated. Using a damage estimate of 15% on the structures in the low crown fire potential area, \$27,199,935 in losses can be estimated for a total of \$49,198,065 in the crown fire potential areas.

The critical facilities in Table 5-31 are also determined to be in the wildfire hazard area as determined by the crown fire potential map.

Table 5-31

Silver Bow County Critical Facilities in Wildfire Hazard Areas	
Facility	Area
Moulton Reservoir #2	Moderate
Red Mountain Tower	Moderate
South Fork Reservoir	Moderate
XL Heights Transmission Site	Moderate
Basin Creek Dam #1	Low
Basin Creek Dam #2	Low
Melrose Post Office	Low
Moulton Reservoir #1	Low

As this analysis shows, a vulnerability of particular concern is the wildfire potential in the Basin Creek area. A wildfire in the Basin Creek watershed could affect the Butte-Silver Bow public water supply. Potential mitigation activities are currently being proposed and investigated for a timely resolution.

The impact on the population can be considered moderate. In many cases, residents can be evacuated before the fire moves into their area. Some residents, however, may choose to remain in the evacuated area.

Although the primary concern is to structures and the interface residents, most of the costs associated with fires, come from firefighting efforts. Additional losses to natural resources, water supplies, and air quality are also typically found. As past events have also shown, infrastructure such as power transmission lines can also be threatened.

WIND & SEVERE THUNDERSTORMS

A severe thunderstorm is defined by the National Weather Service as a thunderstorm that produces wind gusts at or greater than 58 mph (50 kts), hail $\frac{3}{4}$ " or larger, and/or tornadoes. Although not considered "severe", lightning and heavy rain can also accompany thunderstorms. In addition, strong winds can occur outside of thunderstorms when the synoptic weather conditions are favorable. Severe thunderstorms, strong winds, large hail, and tornadoes have all occurred in Silver Bow County.

On May 15, 1883, an estimated F2 tornado on the Fujita scale touched down in Silver Bow County. Six people were injured in this tornado. Homes and other buildings were destroyed eight miles south of Butte. In another incident, a severe thunderstorm passed through Silver Bow County on July 19, 1997. Between 3:00 PM and 3:30 PM that afternoon, microburst winds, estimated at 80-90 mph, blew 500-1000 trees down 5 miles south of Butte. One inch hail was also reported along with street flooding. All repeater sites on Red Mountain were damaged from the storm, including Montana Power, 911, and Montana Highway Patrol. Alternate systems were in place by the next day, but the primary systems took a month to be fully repaired. The National Weather Service, after a ground and aerial survey, concluded that a microburst, straight line winds from a severe thunderstorm, occurred over an approximate five acre area. In and around the microburst, 40-45 acres of forested land over a five mile swath were damaged with some trees over 200 years old were blown over.

A history of severe thunderstorm winds and hail listed in Table 5-32 has been compiled from the National Climatic Data Center, National Weather Service Local Storm Reports, and the Hazard Vulnerability Assessment prepared in 1984.

Table 5-32

Severe Weather Reports for Silver Bow County, Montana				
Date	Location	Type	Speed or Size	Damages
5/15/1883	Eight miles South of Butte	Tornado	F2	Six injuries, homes and other buildings destroyed
7/19/1932	Silver Bow County	Hail	Small Hen's Egg	Animals were killed and almost all homes and schools had windows broken out on the west side
6/8/1958	Silver Bow County	Hail	Unknown	
6/24/1974	Silver Bow County	Thunderstorm Wind	61 mph (53 kts)	
7/8/1975	Silver Bow County	Hail	1.00 in.	
7/9/1975	Silver Bow County	Hail	1.50 in.	
6/6/1976	Silver Bow County	Hail	1.00 in.	\$6 million damage, 17 hour power outages in some areas, funnel cloud spotted on the East Ridge
7/8/1980	Silver Bow County	Hail	1.25 in.	
8/24/1981	Silver Bow County	Thunderstorm Wind	75 mph (65 kts)	
7/4/1982	Silver Bow County	Thunderstorm Wind	Unknown	

Table 5-32 (continued)

Severe Weather Reports for Silver Bow County, Montana				
Date	Location	Type	Speed or Size	Damages
5/14/1984	Silver Bow County	Thunderstorm Wind	58 mph (50 kts)	
6/15/1987	Silver Bow County	Thunderstorm Wind	74 mph (64 kts)	Knocked down trees, power lines, and shingles off of structures
6/18/1987	Silver Bow County	Hail	1.50 in.	
6/21/1988	Silver Bow County	Thunderstorm Wind	69 mph (60 kts)	
6/25/1988	Silver Bow County	Thunderstorm Wind	69 mph (60 kts)	
5/10/1989	Silver Bow County	Thunderstorm Wind	75 mph (65 kts)	
7/2/1990	Silver Bow County	Thunderstorm Wind	Unknown	
8/8/1990	Silver Bow County	Thunderstorm Wind	Unknown	
6/19/1991	Silver Bow County	Thunderstorm Wind	Unknown	
8/12/1993	Butte	Lightning	N/A	Lightning caused power outages - \$5K damage
6/11/1994	Butte	Thunderstorm Winds	61 mph (53 kts)	\$50K
8/21/1995	Butte	Thunderstorm Winds	62 mph (54 kts)	
9/7/1995	Butte	Hail	Unknown	
5/22/1996	Butte	Thunderstorm Winds	59 mph (51 kts)	
7/29/1996	Butte – 8 miles South	Flash Flood	N/A	See Flooding section
8/28/1996	Butte – 5 miles West	Hail	0.75 in.	
6/12/1997	Butte	Funnel Cloud	N/A	Timber Butte Area
7/19/1997	Butte	Hail & Winds Tornado	1.00 in.	See narrative description
7/30/1998	Butte	Flash Flood	N/A	See Flooding section
10/31/1999	Butte	Non-Thunderstorm Winds	54 mph (47 kts)	Uptown Butte lost power
7/22/2000	Butte Airport	Thunderstorm Winds	64 mph (56 kts)	

Table 5-32 (continued)

Severe Weather Reports for Silver Bow County, Montana				
Date	Location	Type	Speed or Size	Damages
7/24/2000	Butte	Thunderstorm Winds	58 mph (50 kts)	Thunderstorm winds moved through uptown Butte between 430 PM and 530 PM, which damaged utility poles and downed trees onto several cars at Park and Main streets. About 200 people were without power from power outages in uptown Butte.
8/4/2001	Butte – 5 miles Northwest	Hail	1.50 in.	
6/21/2002	Butte	Hail	1.00 in.	
8/7/2002	Butte	Hail	0.88 in.	A few cars were damaged by the hail and up to one inch of accumulation was reported during the event.

Based on the American Society of Civil Engineers publication ASCE 7-98, Silver Bow County falls within Design Wind Speed Zone I, a low risk area. In general, however, the entire County is at risk from this hazard. Structures, utilities, and vehicles are most at risk from the wind component of these storms, with crops and livestock being additionally threatened by hail. Mostly likely, though, only isolated areas would be affected by these types of storms rather than encompassing the entire County. This history also shows a probability of at least one of these events occurring in Silver Bow County each year.

Wind and Severe Thunderstorms Vulnerability

With the entire County at risk from wind and severe thunderstorms, estimates of damages are hard to determine. Realistically, an event involving a tornado or severe thunderstorm would most likely affect a small area. If that area, however, was in a developed part of the County, 10-20 homes could be damaged. Fifteen homes at a damage factor of 30% would result in roughly \$337,050 in damages. In that instance, a small percentage of the population would also be at risk. Damages to a critical facility or vulnerable population would also increase the impacts of such an event. Especially for this hazard, the numerous campgrounds in the National Forests become vulnerable populations. Occasionally, these events do occur without warning and could have a greater impact on the population. In terms of the economy, large hail could damage crops or injure livestock and diminish profits.

SUMMARY

This risk assessment represents an approximate history and estimated vulnerabilities to the community from the hazards identified. As with any assessment involving natural or man-made hazards, all potential events may not be represented here and an actual incident may occur in a vastly different way than described. This assessment, however, will be used to try to minimize damages from these events in the future.

Every type of event is different, ranging from population to property to economic impacts. Incidents also have different probabilities and magnitudes even within hazards. For example, a small earthquake will be different than a large earthquake and a moderate flood will be different from both of those. In an attempt to rate hazards and prioritize mitigation activities, a summary of the impacts from an event are presented in Table 5-33. Some hazards have estimates of dollar losses and population impacted whereas others are more qualitatively assessed based on available information from the risk assessment process. For more information on these determinations, see the individual hazard profiles.

Table 5-33

Hazard & Vulnerability Summary for Silver Bow County, Montana				
Hazard	Probability of Disastrous Event (chance in any given year)	Property Impact	Population Impact	Economic Impact
Earthquake	Low	\$300M	100-300	High
Extended Cold & Winter Storms	High	Low	High	Moderate
Hazardous Materials & Water Pollution	Moderate	Low	100-1,000	Low
Wildfire	Moderate	\$50M	Moderate	High
Flooding	Moderate	\$7M	Moderate	Moderate
Blight & Drought	Moderate	Low	Low	Moderate-High
Wind & Severe Thunderstorms	Moderate	\$337,000	Low	Low
Communicable Disease & Bioterrorism	Low	Low	Moderate	Moderate
Dam Failure	Low	\$9M	Moderate	Moderate
Aviation	Moderate	\$100,000- \$350,000	10-100	Low
Terrorism & Violence	Low	Low	Moderate	Low
Structure Fires	Moderate	\$160,000	Low	Low
Near Surface Ground Control Failure & Subsidence	Low	Moderate	Low	Low
Strike & Civil Unrest	Low	Low	Low	Moderate
Volcanic Ash	Low	Low	Low	Low
Landslide	Low	Low	Low	Low
Heat Wave	Low	Low	Low	Low
Avalanche	Low	Low	Low	Low

Mitigation Strategy

Hazard Prioritization

The mitigation strategy is the course of action Butte-Silver Bow City-County and the Town of Walkerville hope to take to prevent losses from disasters in the future. Rather than wait until a disaster occurs, these communities have developed this strategy to move in a proactive direction in disaster prevention. All losses cannot be entirely mitigated, however, some actions can be taken, as funding and opportunities become available, that may reduce the impacts of disasters and eventually save taxpayers money. The mitigation strategies were developed based on direct input from the communities and prioritized through a multi-step process.

Attendees of the July 30, 2003 public meeting were individually polled on the probability of a disastrous event occurring from each hazard, the magnitude or impact of that event to the community, and the ranking of each hazard for mitigation. The results are as follows in Table 6-1.

Table 6-1

Priority Ranking Survey Results for Silver Bow County			
Hazard	Probability of Disastrous Event (chance in any given year)	Magnitude (severity/impact to community)	Priority Rank
Earthquake	Moderate	High	1
Extended Cold & Winter Storms	Moderate-High	Moderate	2
Hazardous Materials & Water Pollution	Moderate	Moderate-High	3
Blight & Drought	Moderate-High	Moderate	4
Wildfire	High	Moderate-High	5
Structure Fires	Moderate-High	Low-Moderate	6
Communicable Disease & Bioterrorism	Moderate	Moderate	7
Wind & Severe Thunderstorms	Moderate	Moderate	8
Heat Wave	Moderate	Low-Moderate	9
Flooding	Low-Moderate	Low-Moderate	10
Terrorism & Violence	Low	Moderate-High	11
Strike & Civil Unrest	Low-Moderate	Moderate-High	12
Aviation	Low	Low-Moderate	13
Dam Failure	Low	Moderate	14
Landslide	Low	Low	15
Volcanic Ash	Low	Low-Moderate	16
Mine Shaft Failure	Not on survey	Not on survey	N/A
Avalanche	Not on survey	Not on survey	N/A

This survey has been considered when developing priorities, however, a greater emphasis has been placed on the results of the risk assessment. In addition, since the survey was initially conducted, other hazards have been added and modified. The 1984 Hazard Vulnerability Analysis defined each of the

February 2004

hazards, compiled a rough history, looked at the vulnerability of the community, created a maximum threat scenario, and estimated a probability. The analysis was a good starting block for this prioritization, however, it did not include all of the hazards that are presently identified and the vulnerabilities have changed. Some minor changes have been made to the original analysis method, but overall, the ranking criteria remains the same. Results of the risk assessment were used in choosing the rankings in each category. The methodology gives each of the criteria a low, medium, or high ranking dependent on a set threshold. The thresholds used in this analysis are as follows:

History:	0 or 1 major incidents in the past 100 years -	Low
	2 to 3 major incidents in the past 100 years -	Moderate
	4 or more major incidents in the past 100 years -	High

Average Vulnerability:	Less than 1% casualties/damage -	Low
	1% to 10% casualties/damage -	Moderate
	More than 10% casualties/damage -	High

Maximum Threat Casualties and Property Damage:	Less than 5% casualties/damage -	Low
	5% to 25% casualties/damage -	Moderate
	More than 25% casualties/damage -	High

Probability in a Five-Year Period:	0 or 1 incidents -	Low
	2 to 9 incidents -	Moderate
	10 or more incidents -	High

Composite scores for each hazard were then assigned by multiplying the score for each factor by its weighting factor and added together. The rating scores and weighting factors were as follows:

Rating Scores:

Low -	0-3 points
Moderate -	4-6 points
High -	7-10 points

Weighting Factors:

History -	2
Average Vulnerability -	5
Maximum Threat -	10
Probability -	7

Using this methodology, the rankings shown in Table 6-2 were given to the hazards.

Table 6-2

Vulnerability Ranking for Hazards in Silver Bow County, Montana					
Hazard	History	Vulnerability	Maximum Threat	Probability	Rank
Earthquake	Moderate	High	High	Low	1
Extended Cold & Winter Storms	High	Low	High	High	2
Hazardous Materials & Water Pollution	Moderate	Moderate	High	Moderate	3
Wildfire	Moderate	Moderate	Moderate	Moderate	4
Flooding	Moderate	Moderate	Moderate	Moderate	5
Blight & Drought	High	Low	Moderate	Moderate	6
Wind & Severe Thunderstorms	Moderate	Low	Moderate	Moderate	7
Communicable Disease & Bioterrorism	Low	Low	Moderate	Low	8
Dam Failure	Low	Moderate	Moderate	Low	9
Aviation	Moderate	Low	Moderate	Moderate	10
Terrorism & Violence	Low	Low	Moderate	Low	11
Structure Fires	Moderate	Low	Low	Moderate	12
Near Surface Ground Failure & Subsidence	Low	Low	Moderate	Low	13
Strike & Civil Unrest	Moderate	Low	Low	Low	14
Volcanic Ash	Low	Low	Moderate	Low	15
Landslide	Low	Low	Low	Low	16
Heat Wave	Low	Low	Low	Low	17
Avalanche	Low	Low	Low	Low	18

Based on these prioritizations, goals and objectives were developed. Various LEPC members and other knowledgeable participants came up with suggested actions to be taken for those goals. The goals, objectives, and many of the suggested actions are listed in the following section.

Goals, Objectives, and Proposed Actions

Goal 1: Prevent damages from earthquakes.

Objective 1.1: Better understand the earthquake hazard in Silver Bow County.

- In-depth fault study and digital mapping
- Educational awareness for the general public on the earthquake hazard

Objective 1.2: Protect our students from earthquake hazards.

- Using shatter-proofing techniques, strengthen windows in schools
- Tie down/secure objects in schools that could fall during an earthquake
- Educational awareness for students on earthquake safety

Objective 1.3: Promote greater structure safety in fault areas.

- Create policies for where structures can and cannot be built based on the hazard information

Goal 2: Minimize suffering during extended cold periods and winter storms.

Objective 2.1: Prepare vulnerable populations for winter weather.

- Work with special needs populations on alternative heating systems
- Develop disaster supply kits for special needs facilities

Objective 2.2: Create manageable mass care during winter weather.

- Coordinate with volunteer agencies on sheltering in difficult weather conditions

Goal 3: Reduce the impact of wildfires and structure fires on the community.

Objective 3.1: Prevent water pollution to the public water supply from wildfires.

- Promote USFS fuels reduction in the Basin Creek watershed

Objective 3.2: Protect homes in the wildland-urban interface from wildfires.

- Expand existing hazard fuels reduction programs to other wildland-urban interface areas

Objective 3.3: Coordinate fire department prevention activities.

- Support the Butte Fire Protection Association in expanding a wildland fire management committee consisting of Silver Bow, state, and federal departments with a wildland-urban interface to coordinate planning training, prevention, and suppression

Objective 3.4: Prevent large commercial structure fires.

- Promote sprinkler system installation in older commercial structures.

Goal 4: Reduce the impacts of a hazardous materials incident.

Objective 4.1: Prevent illness from hazardous materials in vulnerable populations.

- Educate teachers and school staff in schools near hazardous materials facilities and transportation routes in how to limit exposure to hazardous materials to students during an incident

Goal 5: Reduce losses from flooding.

Objective 5.1: Prevent losses to Butte-Silver Bow infrastructure from flooding.

- Install culverts in areas where water runoff is needed.
- Increase stormwater systems in poor drainage areas.

Objective 5.2: Reduce individual losses from flooding.

- Educate the public on flood insurance
- Educate builders on building specifications and floodplain building requirements

Goal 6: Optimize the use of mitigation measures that can be used for all hazards.

Objective 6.1: Use all-hazard mitigation in the schools.

- Put NOAA Weather Radios in the schools
- Create a dedicated phone system for parent information on school evacuations

Goal 7: Minimize effects of terrorism, violence, strikes, and civil unrest.

Objective 7.1: Better secure hospitals, nursing homes, and schools.

- Implement security systems in hospitals
- Implement security systems in schools
- Educate nursing home operators and residents on physical security

Goal 8: Protect residents from near surface ground control failure.

Objective 8.1: Better understand the locations of near surface mine workings.

- Study and assess the locations of near surface mine workings by utilizing local expertise, former remediation and mine workings experts, and knowledgeable residents.

Objective 8.2: Secure near surface mine workings and head frames..

- Bulkhead open mine shafts
- Remove existing head frames
- Ensure the head frames have adequate foundation underpinnings and replace components that exhibit extreme corrosion

Objective 8.3: Increase residential safety from near surface ground control failure

- Make planning department recommendations binding for developers
- Restrict development in areas of known near surface mining activities
- Integrate building restrictions around mine shafts into State building codes
- Educate new builders on near surface mine workings hazards

Goal 9: Reduce future impacts from landslides and avalanches.

Objective 9.1: Prevent losses to residential structures from landslides and avalanches.

- Study potential landslide areas on and near private lands in more detail
- Create a landslide/avalanche technical committee
- Implement a recommendation system for development near landslide areas

To ensure that community goals and other factors are taken into account when prioritizing projects, a prioritization model that uses the following factors has been developed: cost (including management costs), feasibility (politically, socially, and environmentally), population benefit, property benefit, and community priorities.

Each of the factors was ranked low, moderate, or high for each of the projects. The methods used to assign a category and the associated score can be defined as follows:

Cost (including management):	3 Score	Low < \$10,000
	2 Score	Moderate \$10,000-\$50,000
	1 Score	High >\$50,000
Feasibility: (politically, socially, environmentally)	1 Score	Low
	2 Score	Moderate
	3 Score	High
Population Benefit:	1 Score	Low < 25% of population to benefit
	2 Score	Moderate 25%-75% of population to benefit
	3 Score	High > 75% of population to benefit
Property Benefit:	1 Score	Low < 25% of property to benefit
	2 Score	Moderate 25%-75% of property to benefit
	3 Score	High > 75% of property to benefit
Community Priorities: (from survey results)	1 Score	Low - Priority 11-18 Hazards
	2 Score	Moderate - Priority 4-10 Hazards
	3 Score	High - Priority 1-3 Hazards

A summary of the scores for each of the proposed projects can be found in Table 6-3.

Table 6-3

Proposed Actions and Priority Scores for Silver Bow County						
Goal 1: Prevent damages from earthquakes.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Fault study and mapping	Moderate	High	Moderate	Moderate	High	12
Public education	Low	High	Moderate	Low	High	12
Shatter-proof windows in schools	High	High	Moderate	Low	High	10
Tie down program for schools	Low	High	Moderate	Low	High	12
Education program for students	Low	High	Moderate	Low	High	12
Building restriction policies	Moderate	Moderate	Moderate	Moderate	High	11
Goal 2: Minimize suffering during extended cold periods and winter storms.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Alternative heating systems education for special needs	Low	Moderate	Low	Low	High	10
Disaster supply kits for special needs facilities	Moderate	Moderate	Low	Low	High	9
Shelter coordination	Low	Moderate	Low	Low	High	10

Table 6-3 (continued)

Proposed Actions and Priority Scores for Silver Bow County						
Goal 3: Reduce the impact of wildfires and structure fires on the community.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Basin Creek watershed fuels reduction	High	Moderate	High	Moderate	Moderate	10
Homeowner fuels reduction program	Moderate	Moderate	Moderate	Moderate	Moderate	10
Wildland fire management committee	Low	Moderate	Moderate	Moderate	Moderate	11
Commercial sprinkler program	Moderate	Moderate	Low	Moderate	Moderate	9
Goal 4: Reduce the impacts of a hazardous materials incident.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
School facility hazardous materials education	Low	High	Moderate	Moderate	High	13
Goal 5: Reduce losses from flooding.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Culverts	Moderate	Moderate	Moderate	Moderate	Moderate	10
Stormwater systems	High	Moderate	Moderate	Moderate	Moderate	9
Flood insurance education	Low	Moderate	Low	Low	Moderate	9
Floodplain development education	Low	High	Low	Moderate	Moderate	11
Goal 6: Optimize the use of mitigation measures that can be used for all hazards.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
NOAA weather radios in the schools	Low	High	Moderate	Low	High	12
School disaster phone line	Moderate	Moderate	Moderate	Low	High	10
Goal 7: Minimize effects of terrorism, violence, strikes, and civil unrest.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Hospital security systems	Moderate	Moderate	Moderate	Low	Low	8
School security systems	Moderate	Moderate	Moderate	Low	Low	8
Nursing home security education	Low	Moderate	Low	Low	Low	8

Table 6-3 (continued)

Proposed Actions and Priority Scores for Silver Bow County						
Goal 8: Protect residents from near surface ground control failure.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Study mine workings locations	Moderate	Moderate	Moderate	Moderate	Low	9
Bulkhead mine shafts	High	Moderate	Low	Low	Low	6
Remove head frames	Moderate	Low	Low	Low	Low	6
Strengthen head frames	Moderate	Moderate	Low	Low	Low	7
Building requirements near mine workings	Moderate	Moderate	Low	Moderate	Low	8
Restrict building near mine workings	Moderate	Moderate	Moderate	Moderate	Low	9
Strengthen building codes near mine workings	Moderate	Moderate	Low	Moderate	Low	8
Builder mine workings education	Low	Moderate	Low	Low	Low	8
Goal 9: Reduce future impacts from landslides and avalanches.						
<i>Project</i>	<i>Cost</i>	<i>Feasibility</i>	<i>Population Benefit</i>	<i>Property Benefit</i>	<i>Community Priorities</i>	<i>Score</i>
Study landslide potential	Moderate	Moderate	Low	Low	Low	7
Landslide/avalanche committee	Low	High	Low	Low	Low	9
Landslide building recommendations	Moderate	Moderate	Low	Moderate	Low	8

Implementation Plan

Those actions that have received the highest scores will be given the highest priority. As funding or opportunities to initiate these projects come up, the higher priority activities can be prioritized even further with more detailed costs, benefits, and other criteria. In addition, although, Butte-Silver Bow County and the Town of Walkerville work together, some activities are targeted to one jurisdiction. The implementation strategy for some of the higher priority actions can be found in Table 6-4. Note that some of the activities that could be best accomplished together were combined under the higher priority item and other excluded activities represent alternatives to the higher priority items.

The projects represented in Table 6-4 list those projects that ranked highest in the priority ranking model. Other projects not listed may also be considered if they are the best fit for a specific funding source or other planning initiatives.

Table 6-4

Implementation Plan for Actions in Silver Bow County				
Project Description	Jurisdiction	Responsible Agency	Potential Funding Source(s)	Priority Score
Educate teachers and school staff in schools near hazardous materials facilities and transportation routes in how to limit exposure to hazardous materials to students during an incident	Butte-Silver Bow	School Districts DES	Internal EPA	13
In-depth fault study and digital mapping	Butte-Silver Bow Walkerville	DES BSB Planning Dept.	Internal FEMA MBMG	12
Tie down/secure objects that could fall in schools during an earthquake	Butte-Silver Bow	School Districts DES	Internal FEMA	12
Education programs for the public and students on earthquakes	Butte-Silver Bow Walkerville	School Districts BSB Planning Dept. DES	Internal FEMA USGS	12
Put NOAA Weather Radios in the schools	Butte-Silver Bow	School Districts DES	Internal FEMA NWS	12
Policy development for building restrictions in earthquake fault areas	Butte-Silver Bow	BSB Planning Dept.	Internal	11
Support wildland fire management committee consisting of Silver Bow, state, and federal departments with a wildland-urban interface to coordinate planning training, prevention, and suppression	Butte-Silver Bow	Butte Fire Protection Association Silver Bow County Fire Departments	Internal USFS DNRC BLM	11
Floodplain building restrictions and recommendations education for builders	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal FEMA	11
Shatter-proof windows in schools for earthquakes	Butte-Silver Bow	School Districts DES	FEMA	10
Work with special needs populations on alternative heating systems	Butte-Silver Bow Walkerville	DES Northwestern Energy	Internal Private	10
Coordinate with volunteer agencies on sheltering in difficult weather conditions	Butte-Silver Bow Walkerville	DES ARC	Internal	10
Promote USFS fuels reduction in the Basin Creek watershed	Butte-Silver Bow	Basin Creek Fire BSB Public Works	FEMA USFS Firewise DNRC	10
Expand existing hazard fuels reduction programs to other wildland-urban interface areas	Butte-Silver Bow	Butte Fire Protection Association DES	FEMA USFS Firewise DNRC	10
Install culverts in areas where water runoff is needed.	Butte-Silver Bow Walkerville	BSB Public Works Walkerville Public Works	Internal FEMA	10
Create a dedicated phone system for parent information on school evacuations	Butte-Silver Bow	School Districts DES	Internal	10
Develop disaster supply kits for special needs facilities	Butte-Silver Bow	DES ARC	Internal ARC	9
Commercial sprinkler system promotion program	Butte-Silver Bow Walkerville	Silver Bow County Fire Departments BSB Planning Dept.	Internal FEMA	9

Table 6-4 (continued)

Implementation Plan for Actions in Silver Bow County				
Project Description	Jurisdiction	Responsible Agency	Potential Funding Source(s)	Priority Score
Increase stormwater systems in poor drainage areas	Butte-Silver Bow	BSB Public Works Walkerville Public Works	Internal FEMA	9
Educate the public on flood insurance	Butte-Silver Bow	BSB Planning Dept.	Internal FEMA	9
Study and assess mine workings locations	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal MBMG MT Tech	9
Restrict development in areas of known near surface mining activities	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal	9
Create a landslide/avalanche technical committee	Butte-Silver Bow	DES BSB Planning Dept.	Internal	9
Implement security systems in hospitals	Butte-Silver Bow	Hospitals BSB Law Enforcement	Internal Private	8
Implement security systems in schools	Butte-Silver Bow	School Districts BSB Law Enforcement	Internal	8
Educate nursing home operators and residents on physical security	Butte-Silver Bow Walkerville	Nursing Homes BSB Law Enforcement	Internal	8
Make planning department recommendations binding for developers in mine shaft areas or integrate building restrictions around mine shafts into State building codes	Butte-Silver Bow Walkerville	BSB Planning Dept. BSB Council Walkerville Town Council	Internal	8
Educate new builders on mine workings hazards	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal	8
Study potential landslide areas on and near private lands in more detail	Butte-Silver Bow	BSB Planning Dept.	Internal FEMA	8

The enabling legislation for the implementation of this plan specifically comes from Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390). The Interim Final Rule for this legislation was published in the Federal Register on February 26, 2002 at 44 CFR Part 201. Other legislation, orders, and plans that support the initiatives presented in this plan include:

- Presidential Executive Order 12898, Environmental Justice
- Presidential Executive Order 11988, Floodplain Management
- Presidential Executive Order 11990, Protection of Wetlands
- Montana Code Annotated, Title 10, Chapter 3, Disaster and Emergency Services
- Montana Code Annotated, Title 76, Chapter 5, Flood Plain and Floodway Management
- Montana Code Annotated, Title 50, Chapter 60, Building Construction Standards
- Montana Code Annotated, Title 76, Chapter 2, Planning and Zoning
- Butte-Silver Bow Building Codes
- Butte-Silver Bow Floodplain Ordinance

The approval of this plan shows that hazard mitigation is an important priority in Butte-Silver Bow and the Town of Walkerville. As a priority, the information contained in this plan will be used in current and future planning initiatives. Butte-Silver Bow currently uses a building permit review process for new structures. The Butte-Silver Bow Planning Department will incorporate the mitigation goals and

objectives contained here into their building permit review process. Butte-Silver Bow will further incorporate these recommendations into a capital improvements plan. The Town of Walkerville will also include these recommendations into a capital improvements plan, if and when one is developed.

Plan Maintenance Procedures

This plan is maintained for Butte-Silver Bow and the Town of Walkerville by the Butte-Silver Bow LEPC. This committee has representatives from both jurisdictions and was active in the development of this plan. Annually at the January LEPC meeting, typically held on the fourth Wednesday of the month at noon in the Butte-Silver Bow Courthouse, a public meeting will be held to review the plan. Notices will be posted in The Montana Standard newspaper and press releases will be sent to the local media. Needed changes should be made and committee approval may then take place at the January or subsequent meetings. As hazard information is added or updated, events occur, and projects are completed, the plan will need to be updated. Each year, a notice of approval will be sent to Montana Disaster & Emergency Services by the Butte-Silver Bow LEPC Chairperson, and if major changes take place, a revised version of the plan will also be submitted. Every five years, the plan will be submitted to Montana Disaster & Emergency Services and the Federal Emergency Management Agency Regional Office for their approval. The next formal submission will occur in January 2009.

An important aspect of this plan since its inception has been public involvement. To encourage continued participation, comments can be directed to the Butte-Silver Bow LEPC Chairperson. This committee can be reached through Disaster & Emergency Services at:

Butte-Silver Bow Disaster & Emergency Services
Butte-Silver Bow Courthouse
155 West Granite
Butte, MT 59701
406-497-6295

Comments will be considered during the annual review of this plan. The public is also encouraged to attend the annual plan review meeting. If needed, a special LEPC subcommittee will be developed to hold meetings and coordinate plan changes and comments.

Appendix A

Hazard Maps

Appendix B

Public Meeting Documentation



July 21, 2003

PRESS RELEASE

For Immediate Release

Contact: Pam Pedersen
Big Sky Hazard Management
406-581-4512

OR

Virginia Hanson, Risk Analyst
Butte-Silver Bow City-County
406-497-6432

Butte-Silver Bow to Develop Hazard Mitigation Plan

The Butte-Silver Bow Local Emergency Planning Committee (LEPC) is trying to make the community safer. The county has received a grant from the Federal Emergency Management Agency (FEMA), now part of the Department of Homeland Security, and Montana Disaster and Emergency Services to create a Hazard Mitigation Plan. The plan will address major hazards such as earthquakes and wildfires and list possible measures that could be taken to make the community more disaster resistant. Mitigation can take many different forms from construction projects to public education. This plan will also allow the county to be eligible for future federal and state mitigation grants.

“Public involvement is an extremely important part of this plan,” says Larry Akers, State Mitigation Officer with Montana Disaster and Emergency Services. “I would encourage anyone with ideas or an interest in helping make Butte-Silver Bow less vulnerable to disasters to attend the public meetings. This plan will guide how the community deals with disaster prevention in the future.”

The first meeting is scheduled for noon on Wednesday, July 30th in the Butte-Silver Bow Courthouse First Floor Conference Room. The focus will be hazard identification.

LEGAL NOTICES
Published in The Montana Standard

PUBLIC MEETING

Re: Silver Bow Countywide Pre-Disaster Mitigation Plan

DATE: Wednesday, July 30 at Noon

LOCATION: Butte-Silver Bow Courthouse First Floor Conference Room

The Butte-Silver Bow Local Emergency Planning Committee (LEPC) is trying to make the community safer. The county has received a grant to create a Hazard Mitigation Plan. The plan will address major hazards such as earthquakes and wildfires and list possible measures that could be taken to make the community more disaster resistant.

Public involvement in the planning effort is encouraged. The focus for this first meeting will be hazard identification. If you cannot attend but would like to be involved, contact Pam at 406-581-4512.

PUBLIC MEETING NOTICE: A public meeting regarding the Silver Bow County Pre-Disaster Mitigation Plan, including Butte-Silver Bow City-County and the City of Walkerville, will be held in conjunction with the Local Emergency Planning Committee Meeting on August 27, 2003 at 12PM in the Butte-Silver Bow Courthouse, 155 West Granite, Butte - First Floor Conference Room. This plan recommends future mitigation actions to reduce the community's vulnerability to hazards. Public input is encouraged. For more information or to provide comments, please contact Big Sky Hazard Management at PO Box 3910, Bozeman, MT 59772 or 406-581-4512.

Appendix C

Meeting Attendance Records

July 30, 2003 Public Meeting Attendees

Bernard Harrington	Mayor, Walkerville
Brad Neal	NorthWestern Energy
Dan Dennehy	BSB Health Department Director
Dan Powers	BSB Environmental Health
Dave Kneebone	BSB/Little Basin Creek VFD
Dr. Jevon Clark	DVM, Animal Hospital
Jared Aarons	KXLF, TV Media
Jean Pentecost	Engineer, Public Works
John Lasky	BSB Fire Marshal
John Walsh	BSB Sheriff
Jon Sesso	BSB Planning Director
Kathleen Nelson	Health Department Officer
Kathy Lasky	BSB 911 Supervisor
Kerry Kavanaugh	KWYB, TV Media
Lee LaBreche	BSB/Coroner
Michele Brennick	School District #1 RSVP Director
Mike Leary	Terra Verde VFD
Mike McGree	A-1 Ambulance
Pam Haxby Cote	Community Development Director
Pam Pedersen	Big Sky Hazard Management
Pat Dudley	St. James Health Care Human Resources Director
Rick Griffith	Bert Mooney Airport Manager
Rick Kravas	School District(s) School Preparedness Chairman
Virginia Hanson	BSB Risk Manager
Wilma Puich	BSB DES Coordinator

August 27, 2003 Public Meeting Attendees

Bernard Harrington	Mayor, Walkerville
Brad Neal	NorthWestern Energy
Dan Dennehy	BSB Health Department Director
Dan Powers	BSB Environmental Health
Jean Pentecost	Engineer, Public Works
John Lasky	BSB Fire Marshal
John Walsh	BSB Sheriff
Jon Sesso	BSB Planning Director
Judy Jacobsen	BSB Chief Executive
Michele Brennick	School District #1 RSVP Director
Pam Haxby Cote	Community Development Director
Pam Pedersen	Big Sky Hazard Management
Rick Griffith	Bert Mooney Airport Manager
Virginia Hanson	BSB Risk Manager
Wilma Puich	BSB DES Coordinator

October 29, 2003 LEPC Meeting Attendees

Bernard Harrington	Mayor, Walkerville
Bob McCarthy	BSB County Attorney
Brad Neal	NorthWestern Energy
Dan Dennehy	BSB Health Department Director
Dan Powers	BSB Environmental Health
Jack Cullen	Silver Bow Fire Council
James Winn	American Red Cross
John Lasky	BSB Fire Marshal
John Walsh	BSB Sheriff
Judy Jacobsen	BSB Chief Executive
Kathy Lasky	911 Supervisor
Kathleen Nelson	BSB Health Department
Lee LaBreche	BSB Coroner
Michele Brennick	School District #1 RSVP Director
Mike Leary	Volunteer Fire Council
Mike McGree	A-1 Ambulance
Pat Dudley	St. James Health Care Human Resources Director
Pam Pedersen	Big Sky Hazard Management
Rick Griffith	Bert Mooney Airport Manager
Rick Kravas	School Preparedness Chairman
Jason Parish	American Red Cross
Wilma Puich	BSB DES Coordinator

December 17, 2003 LEPC Meeting Attendees

Art Collins	Montana Highway Patrol
Bernard Harrington	Mayor, Walkerville
Brad Neal	NorthWestern Energy
Dan Dennehy	BSB Health Department Director
Dan Powers	BSB Environmental Health
Dave Kneebone	BSB/Little Basin Creek VFD
James Kiser	St. James Hospital
John Walsh	BSB Sheriff
Jon Sesso	BSB Planning Director
Judy Jacobsen	BSB Chief Executive
Kathleen Nelson	BSB Health Department
Marilyn Cameron	EHS Coordinator, MT Tech
Mike Challeen	ASiMI
Mike Leary	Volunteer Fire Council
Pat Dudley	St. James Health Care Human Resources Director
Pam Haxby Cote	Community Development Director
Pam Pedersen	Big Sky Hazard Management
Rick Kravas	School Preparedness Chairman
Virginia Hanson	BSB Risk Manager

January 29, 2004 Public Meeting Attendees

Bernard Harrington	Mayor, Walkerville
Bob McCarthy	BSB County Attorney
Brad Neal	NorthWestern Energy
Dan Dennehy	BSB Health Department Director
Dan Powers	BSB Environmental Health
Dave Kneebone	BSB/Little Basin Creek VFD
Jean Pentecost	Engineer, Public Works
Jeff Miller	BSB Fire
John Walsh	BSB Sheriff
Jon Sesso	BSB Planning Director
Judy Jacobsen	BSB Chief Executive
Kathleen Nelson	BSB Health Department
Marilyn Cameron	EHS Coordinator, MT Tech
Mike Challeen	ASiMI
Mike Leary	Volunteer Fire Council
Pam Haxby Cote	Community Development Director
Pam Pedersen	Big Sky Hazard Management
Stephanie Berg	Student RN – MT Tech
Virginia Hanson	BSB Risk Manager
Wilma Puich	BSB DES

Appendix D

Public Meeting Handout Materials

All-Hazard Mitigation Plan

“The Basic Questions” Information Sheet

WHAT: Silver Bow County has received a grant from the Federal Emergency Management Agency (FEMA) through Montana Disaster and Emergency Services (MT DES) to create an All-Hazard Mitigation Plan (aka PDM Plan). This plan generally has four parts:

1. The Planning Process
2. A Risk Assessment
3. A Mitigation Strategy
4. The Plan Implementation

The basic definition of hazard mitigation is “any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.” Mitigation can take many different forms from construction projects to public education. Examples from other communities include creating tougher zoning regulations in hazard areas, elevating or purchasing homes in the floodplain, retrofitting buildings for seismic hazards, putting fences around drinking water supplies, community warning alert systems, enlarging culverts, and educating the public on insurance. Of course, every community is different, but the basic idea is to make your community safer and more disaster resistant.

WHY: By taking action before a disaster strikes, the impact to your community during a disaster can be minimized. More specifically, this plan (to be approved by FEMA and MT DES) is a new requirement under the Disaster Mitigation Act of 2000 in order for communities to receive Hazard Mitigation Grant Program funds and other types of disaster assistance. The plan must be in place before the disaster hits or the community loses out on this potential funding. More importantly, though, this plan will clarify the hazards that face the community and what actions can be taken to minimize them.

WHEN: We have until November 1, 2003 to complete this plan, however, as long as a plan is being developed, your community will not lose out on potential funding. The absolute deadline for this grant is June 30, 2004.

WHERE: Butte-Silver Bow City-County government and the Town of Walkerville will need to be involved in the planning process and sign off on the finished plan. If a community for some reason decides not to participate, this will be documented, and they will not be eligible for certain types of FEMA funding.

HOW: Big Sky Hazard Management will research and write the plan, however, public and local government participation is required. Public meetings will be held in conjunction with the LEPC meetings during the months of July, August, and September, and a website will be developed to encourage citizen involvement.

Your questions, concerns, or ideas can be sent to:

Pam Pedersen
Big Sky Hazard Management
406-581-4512
ppedersen@bigsky.net

**Hazards Identified in the Butte/Silver Bow Hazard Vulnerability Assessment
Dated 2/20/01**

Hazard from Assessment	Proposed New Section
Extended Cold	Extended Cold & Winter Storms
Earthquake	Earthquake
Water Pollution (in)	Hazardous Materials
Hazardous Material (truck)	Hazardous Materials
Winter Storm	Extended Cold & Winter Storms
Bomb Threat (explosion)	Terrorism & Violence
Flood	Flooding
Medical Structure Collapse	(depends on cause)
Communicable Disease	Communicable Disease
Structure Fire	Structure Fires
Passenger Plane Crash	Aviation
Hazardous Material (fixed site)	Hazardous Materials
Small Plane Crash	Aviation
Hazardous Material (rail)	Hazardous Materials
Civil Disorder	Terrorism & Violence
Water Pollution (out)	Hazardous Materials
Volcanic Ash	Volcanic Ash
Blight, Drought	Blight & Drought

Others to Consider:

Landslides & Soil Failure

Wind & Severe Thunderstorms

Wildfire

Dam Failure

Heat Wave

1. Please circle what you believe the probability and magnitude of each hazard is.
2. Please prioritize the hazards for mitigation activities (1=highest priority, 16=lowest priority)

Hazard	Probability of <i>Disastrous</i> Event (chance in any given year)			Magnitude (severity/impact to community)			Priority Rank
Aviation	Low	Moderate	High	Low	Moderate	High	
Blight & Drought	Low	Moderate	High	Low	Moderate	High	
Communicable Disease	Low	Moderate	High	Low	Moderate	High	
Dam Failure	Low	Moderate	High	Low	Moderate	High	
Earthquake	Low	Moderate	High	Low	Moderate	High	
Extended Cold & Winter Storms	Low	Moderate	High	Low	Moderate	High	
Flooding	Low	Moderate	High	Low	Moderate	High	
Hazardous Materials	Low	Moderate	High	Low	Moderate	High	
Heat Wave	Low	Moderate	High	Low	Moderate	High	
Landslides & Soil Failure	Low	Moderate	High	Low	Moderate	High	
Structure Fires	Low	Moderate	High	Low	Moderate	High	
Terrorism & Violence	Low	Moderate	High	Low	Moderate	High	
Volcanic Ash	Low	Moderate	High	Low	Moderate	High	
Wildfire	Low	Moderate	High	Low	Moderate	High	
Wind & Severe Thunderstorms	Low	Moderate	High	Low	Moderate	High	
Winter Storms & Cold Spells	Low	Moderate	High	Low	Moderate	High	
	Low	Moderate	High	Low	Moderate	High	
	Low	Moderate	High	Low	Moderate	High	

Prioritization Results from the Last Meeting (July 30, 2003)

Hazard	Probability of Disastrous Event (chance in any given year)	Magnitude (severity/impact to community)	Priority Rank
Earthquake	Moderate	High	1
Extended Cold & Winter Storms	Moderate-High	Moderate	2
Hazardous Materials & Water Pollution	Moderate	Moderate-High	3
Blight & Drought	Moderate-High	Moderate	4
Wildfire	High	Moderate-High	5
Structure Fires	Moderate-High	Low-Moderate	6
Communicable Disease & Bioterrorism	Moderate	Moderate	7
Wind & Severe Thunderstorms	Moderate	Moderate	8
Heat Wave	Moderate	Low-Moderate	9
Flooding	Low-Moderate	Low-Moderate	10
Terrorism & Violence	Low	Moderate-High	11
Strike & Civil Unrest	Low-Moderate	Moderate-High	12
Aviation	Low	Low-Moderate	13
Dam Failure	Low	Moderate	14
Landslide & Soil Failure	Low	Low	15
Volcanic Ash	Low	Low-Moderate	16
Mine Shaft Failure	N/A	N/A	N/A

Hazard Vulnerability Scores

Using the methodology used by Butte-Silver Bow Disaster Emergency Services to assess the vulnerabilities to hazards that looks at history, vulnerability, maximum threat, and probability with some minor changes, the following scores were given to each of the hazards. The analysis was based on the information gathered to date on each of the hazards.

1.	Earthquake	164
2.	Extended Cold & Winter Storms	159
3.	Wildfire	139
4.	Hazardous Materials & Water Pollution	132
5.	Flooding	127
6.	Blight & Drought	106
7.	Wind & Severe Thunderstorms	97
8.	Communicable Disease & Bioterrorism	95
9.	Dam Failure	94
10.	Aviation	86
11.	Terrorism & Violence	83
12.	Structure Fires	72
13.	Mine Shaft Failure	70
14.	Strike & Civil Unrest	69
15.	Volcanic Ash	59
16.	Landslide & Soil Failure	49
17.	Heat Wave	45
18.	Avalanche	24

Developing Goals and Objectives

Based on FEMA's guidance, the goals and objectives should "guide the development and implementation of mitigation measures."

Definitions from FEMA's Plan Criteria:

Goals are general guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

Examples of Goals and Objectives:

- Goal 1: Reduce economic impacts of drought.
 - Objective 1.1: Minimize damage to local crops due to drought situations.
 - Action 1.1.1: Develop water-rationing measures that will be implemented during a drought situation.
 - Timeframe: 1 year
 - Funding: No additional funding required
 - Organization: Department of Environment
 - Action 1.1.2: Educate residents on the benefits of conserving water at all times, not just during a drought.
 - Timeframe: 1 year
 - Funding: State Mitigation Fund
 - Organization: Department of Environment
 - Action 1.1.3: Work with local farmers to investigate the use of more drought-resistant crops.
 - Timeframe: Ongoing
 - Funding: No additional funding required
 - Organization: University Extension Service & Planning Department
 - Objective 2.1: Install security measures at the anhydrous ammonia transfer and storage facility.
 - Objective 2.2: Increase the level of security of the facility using landscape design, lighting, and vehicle barriers.
 - Objective 2.3: Assess feasibility of hardening product storage and handling infrastructure.

Examples of Mitigation Measures

(from *Developing the Mitigation Plan*, FEMA 386-3 and *Integrating Human-Caused Hazards Into Mitigation Planning*, FEMA 386-7)

Prevention:	Structural Projects:
▪ Building codes	▪ Channel maintenance
▪ Density controls	▪ Dams/reservoirs
▪ Design review requirements	▪ Safe room/shelter
▪ Easements	▪ Levees
▪ Floodplain development regulations	
▪ Floodplain zoning	Human Caused Hazards:
▪ Forest fire fuel reduction	▪ Security through landscaping
▪ Hillside development regulations	▪ Access control
▪ Open space preservation	▪ Site lighting
▪ Stormwater management regulations	▪ Harden utility locations
▪ Subdivision and development regulations	▪ Blast-resistant construction
▪ Transfer of development rights	▪ Protect ventilation systems
	▪ Alternative drinking supplies
Property Protection:	▪ Emergency power systems
▪ Acquisition of hazard-prone structures	▪ Fire protection systems
▪ Construction of barriers around structures	▪ Regular exercises/drills
▪ Elevation of structures	▪ Site monitoring
▪ Structural retrofits	▪ Parking control
Public Education & Awareness:	Seismic-Specific:
▪ Hazard information centers	▪ Replace brittle equipment/utilities
▪ Public education and outreach programs	▪ Retrofit bridges, overpasses
▪ Real estate disclosure	▪ Utility distribution shut-off valves
	▪ Brace critical equipment
Natural Resource Protection:	▪ Strengthen weak buildings
▪ Best management practices (BMPs)	
▪ Forest and vegetation management	Wildfire-Specific:
▪ Stream corridor restoration	▪ Create defensible space by homes
▪ Stream dumping regulations	▪ Build with fire-resistant materials
▪ Urban forestry and landscape management	▪ Provide multiple access routes
▪ Wetlands development regulations	
	Flood-Specific:
Emergency Services:	▪ Elevate vulnerable equipment
▪ Critical facilities protection	▪ Relocation/elevation/acquisition
▪ Emergency response services	▪ Install backflow valves
▪ Hazard threat recognition	
▪ Hazard warning systems	Wind-Specific:
▪ Health and safety maintenance	▪ Higher grade electrical poles
▪ Post-disaster mitigation	▪ Back-up power to vital facilities
	▪ Remove dead trees/branches
	▪ Analyze shelters for resistance

Ideas for Mitigation Goals and Objectives:

- 1.
- 2.
- 3.
- 4.

Mitigation Project/Action Ideas:

Project #1 Description:

Estimated Cost:

Potential Funding Source(s):

Responsible Agency/Organizations:

Project #2 Description:

Estimated Cost:

Potential Funding Source(s):

Responsible Agency/Organizations:

Project #3 Description:

Estimated Cost:

Potential Funding Source(s):

Responsible Agency/Organizations:

Mitigation Goals and Objectives

Goal 1: Prevent damages from earthquakes.

Objective 1.1: Understand the earthquake hazard in Silver Bow County better.

Objective 1.2: Protect our students from earthquake hazards.

Goal 2: Minimize suffering during extended cold and winter storms.

Objective 2.1: Educate the public on winter weather.

Objective 2.2: Create manageable mass care during winter weather.

Goal 3: Reduce the impact of wildfires on the community.

Objective 3.1: Prevent water pollution to the public water supply from wildfires.

Objective 3.2: Protect homes in the wildland-urban interface from wildfires.

Objective 3.3: Coordinate fire department prevention activities.

Goal 4: Reduce the impacts of a hazardous materials incident.

Objective 4.1: Prevent illness from hazardous materials in vulnerable populations.

Goal 5: Reduce losses from flooding.

Objective 5.1: Prevent losses to Butte-Silver Bow infrastructure from flooding.

Objective 5.2: Reduce individual losses from flooding.

Goal 6: Optimize the use of mitigation measures that can be used for all hazards.

Objective 6.1: Use all-hazard mitigation in the schools.

Goal 7: Minimize effects of terrorism, violence, strikes, and civil unrest.

Objective 7.1: Enable law enforcement to handle major threats to the community.

Objective 7.2: Better secure hospitals, nursing homes, and schools.

Goal 8: Protect residents from mine shaft and soil failure.

Objective 8.1: Better understand mine shaft locations.

Objective 8.2: Secure open mine shafts and head frames.

Objective 8.3: Increase residential safety from mine failure.

Goal 9: Reduce future impacts from landslides and avalanches.

Objective 9.1: Prevent losses to residential structures from landslides and avalanches.

Other suggestions, comments?

Send to: Pam Pedersen
ppedersen@bigsky.net
406-581-4512

The projects represented in Table 6-4 list those projects that ranked highest in the priority ranking model. Other projects not listed may also be considered if they are the best fit for a specific funding source or other planning initiatives.

Table 6-4

Implementation Plan for Actions in Silver Bow County				
Project Description	Jurisdiction	Responsible Agency	Potential Funding Source(s)	Priority Score
Educate teachers and school staff in schools near hazardous materials facilities and transportation routes on how to limit student and faculty exposure to hazardous materials during an incident	Butte-Silver Bow	School Districts DES	Internal EPA	13
In-depth fault study and digital mapping	Butte-Silver Bow Walkerville	DES BSB Planning Dept.	Internal FEMA MBMG	12
Tie down/secure objects that could fall in schools during an earthquake	Butte-Silver Bow	School Districts DES	Internal FEMA	12
Put NOAA Weather Radios in the schools	Butte-Silver Bow	School Districts DES	Internal FEMA NWS	12
Support wildland fire management committee consisting of Silver Bow, state, and federal departments with a wildland-urban interface to coordinate planning training, prevention, and suppression	Butte-Silver Bow	Butte Fire Protection Association Silver Bow County Fire Departments	Internal USFS DNRC BLM	11
Shatter-proof windows in schools for earthquakes	Butte-Silver Bow	School Districts DES	FEMA	10
Work with special needs populations on alternative heating systems	Butte-Silver Bow Walkerville	DES Northwestern Energy	Internal Private	10
Coordinate with volunteer agencies on sheltering in difficult weather conditions	Butte-Silver Bow Walkerville	DES ARC	Internal	10
Promote USFS fuels reduction in the Basin Creek watershed	Butte-Silver Bow	Basin Creek Fire BSB Public Works	FEMA USFS Firewise DNRC	10
Expand existing hazard fuels reduction programs to other wildland-urban interface areas	Butte-Silver Bow	Butte Fire Protection Association DES	FEMA USFS Firewise DNRC	10
Install culverts in areas where water runoff is needed	Butte-Silver Bow Walkerville	BSB Public Works Walkerville Public Works	Internal FEMA	10
Create a dedicated phone system for parent information on school evacuations	Butte-Silver Bow	School Districts DES	Internal	10
Develop disaster supply kits for special needs facilities	Butte-Silver Bow	DES ARC	Internal ARC	9
Increase stormwater systems in poor drainage areas	Butte-Silver Bow	BSB Public Works Walkerville Public Works	Internal FEMA	9
Educate the public on flood insurance	Butte-Silver Bow	BSB Planning Dept.	Internal FEMA	9

Table 6-4 (continued)

Implementation Plan for Actions in Silver Bow County				
Project Description	Jurisdiction	Responsible Agency	Potential Funding Source(s)	Priority Score
Study and assess mine workings locations	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal MBMG MT Tech	9
Restrict development in areas of known near surface mining activities	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal	9
Create a landslide/avalanche technical committee	Butte-Silver Bow	DES BSB Planning Dept.	Internal	9
Implement security systems in hospitals	Butte-Silver Bow	Hospitals BSB Law Enforcement	Internal Private	8
Implement security systems in schools	Butte-Silver Bow	School Districts BSB Law Enforcement	Internal	8
Educate nursing home operators and residents on physical security	Butte-Silver Bow Walkerville	Nursing Homes BSB Law Enforcement	Internal	8
Make planning department recommendations binding for developers in mine shaft areas and/or integrate building restrictions around mine shafts into State building codes	Butte-Silver Bow Walkerville	BSB Planning Dept. BSB Council Walkerville Town Council	Internal	8
Educate new builders on mine workings hazards	Butte-Silver Bow Walkerville	BSB Planning Dept.	Internal	8
Study potential landslide areas on and near private lands in more detail	Butte-Silver Bow	BSB Planning Dept.	Internal FEMA	8

Appendix E

References

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Appendix F

Acronyms

Acronyms

ARC – American Red Cross
ASCE – American Society of Civil Engineers
BLM – Bureau of Land Management
BSB – Butte-Silver Bow
DES – Disaster and Emergency Services
DNRC – Department of Natural Resources and Conservation
DOT – Department of Transportation
EAS – Emergency Alert System
EMS – Emergency Medical Services
EPA – Environmental Protection Agency
ERNS – Emergency Response Notification System
FAA – Federal Aviation Administration
FBI – Federal Bureau of Investigation
FEMA – Federal Emergency Management Agency
FERA – Federal Emergency Relief Administration
FHBM – Flood Hazard Boundary Map
FIRM – Flood Insurance Rate Map
GIS – Geographic Information System
IWW – International Workers of the World
LEPC – Local Emergency Planning Committee
LPG – Liquefied Petroleum Gas
MHP – Montana Highway Patrol
MBMG – Montana Bureau of Mines and Geology
NID – National Inventory of Dams
NOAA – National Oceanic and Atmospheric Administration
NTSB – National Transportation & Safety Board
NWS – National Weather Service
PGA – Peak Ground Acceleration
SARS – Severe Acute Respiratory Syndrome
USACE – United States Army Corps of Engineers
USDA – United States Department of Agriculture
USGS – United States Geological Survey
USFS – United States Forest Service